Using VMware Fusion

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VMware Fusion 10.0
VMware Fusion Pro 10.0

vmware®

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docfeedback@vmware.com

VMware, Inc.
3401 Hillview Ave.
Palo Alto, CA 94304
www.vmware.com

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Using VMware Fusion

Using VMware Fusion describes how to use VMware Fusion® to create, use, and manage virtual machines. It also describes how to install, configure, upgrade, and uninstall Fusion.

Intended Audience

This information is intended for anyone who wants to install, upgrade, or use Fusion.

Getting Started with Fusion

1

With Fusion, you can run personal computer (PC) applications and devices on your Intel-based Mac.

Designed for the Mac user, Fusion takes advantage of the security, flexibility, and portability of virtual machines to run Windows and other x86 operating systems at the same time as macOS.

This chapter includes the following topics:

- About VMware Fusion
- About VMware Fusion Pro
- System Requirements for Fusion
- Install Fusion
- Start Fusion
- How-To Videos
- Take Advantage of Fusion Online Resources

About VMware Fusion

Take a quick look at what Fusion does and how it works.

What Fusion Does

Fusion enables you to run your Windows applications and PC-only devices on your Intel-based Mac. You can run multiple operating systems and applications at the same time, along with your Mac applications. The operating systems and applications are isolated in secure virtual machines.

How Fusion Works

Fusion maps the physical hardware resources to the virtual machine's resources, so each virtual machine has its own processor, memory, disks, I/O devices and so on. Each virtual machine is the full equivalent of a standard x86 computer, although it is represented in a single file package on the Mac.

After you install Fusion and create a virtual machine, you can install and run complete, unmodified operating systems, and associated application software in the virtual machine, just as on a physical PC. Operating systems you can use include Windows, Linux, and macOS. Fusion offers the benefits of having a second PC without its added expense, physical setup, and maintenance.

The operating system of the computer on which you run Fusion is called the host. Mac OS X, Mac OS X Server, OS X, and macOS are the only hosts supported for Fusion. The virtualized operating system you run inside Fusion is called the guest.

About VMware Fusion Pro

Fusion Pro provides advanced virtualization features for managing the virtual machines on your Mac.

Fusion Pro provides the following virtualization features:

- Clone a virtual machine
- Ability to power on a virtual machine to firmware
- Export a virtual machine to OVF format
- Restrict a virtual machine
- Set a keyboard shortcut for a virtual machine
- Create advanced custom networking configurations
- Connect to a remote server
- Obtain information from the Virtual Machine Library window, such as processor, memory, network, and disk information for a virtual machine
- Set bandwidth, packet loss, and latency for a virtual network adapter to simulate various network environments
- Set the firmware type
- Enable UEFI Secure Boot
- Enable VBS (virtualization-based security) for a Windows 10 and later virtual machine
- Use Rest API

System Requirements for Fusion

Verify that you have the minimum system requirements for installing and using Fusion.

- The following processors are supported.
  - Processors on all Macs launched in 2011 or later except for the Intel® Xeon® W3565 processor when used on the 2012 Mac Pro Quad Core
  - Processors on 2010 Mac Pro Six Core, Eight Core, and Twelve Core
- The following Metal host graphics rendering engine requirements apply.
  - Hardware Requirements
    - MacBook, Early 2015 or later
    - MacBook Air, Mid 2012 or later
    - MacBook Pro, Mid 2012 or later

    - Mac Mini, Late 2012 or later
    - iMac, Late 2012 or later
    - Mac Pro, Late 2013 or later

      See https://support.apple.com/en-us/HT205073 for information about Mac support of Metal.
  - Software Requirements
    - macOS 10.12.5 or later
- OS X 10.11 or later for the host OS.
- Operating system installation media (disk or disk image) for virtual machines. Windows operating systems are available separately from Microsoft and other retailers.

  Important Fusion does not provide any operating systems for installation on virtual machines that you create with Fusion. You must provide the operating system installation media.
- 4 GB of memory, 8 GB recommended.
- 750 MB of free disk space for Fusion, and at least 5 GB of free disk space for each virtual machine.

  Note You must have enough memory to run macOS, plus the memory required for each guest operating system and for applications on the Mac and in the virtual machines.

Install Fusion

You install Fusion in the same way you install other macOS applications.

Installation of Fusion does not modify existing virtual machines.

Prerequisites

- Verify that you have the administrator password for your Mac.
- Download the Fusion installer file to your Mac. You can obtain the Fusion installer file from the VMware website.
- Verify that you have the appropriate license key. For example, if you are using VMware Fusion Pro, you must provide a Fusion Pro license key to activate the Fusion Pro features.

For information about installing Fusion Pro for Horizon FLEX, see the *VMware Horizon FLEX Client User Guide*.

Procedure

1. Double-click the Fusion `.dmg` file to open it.

   The contents of the disk image appear in the Fusion Finder window.
2. In the Finder window, drag the **VMware Fusion** icon to the **Applications** folder icon.
3. When prompted, type your administrator user name and password.

   Fusion is installed in the `Applications` folder on your Mac.

Start Fusion

Start using Fusion.

Prerequisites

Verify that you have the administrator password for your Mac.

Procedure

1 In the Applications folder, double-click **VMware Fusion**.

The Virtual Machine Library window appears. From this window, you can start working with virtual machines.

2 (Optional) To save Fusion in the Mac Dock, right-click the icon, and select **Options > Keep in Dock**.

How-To Videos

Watch online videos about using Fusion.

If you are new to Fusion, watch some how-to videos to become familiar with Fusion features.

Procedure

- In Fusion, click **Help > Video Tutorials** to access a wide variety of topics that help you get started with Fusion.

What to do next

On the Fusion Support Center page, you can find support and troubleshooting information for running Windows and Linux on the Mac, such as Windows activation issues, sharing data, working with virtual disks, and many other topics. See the Fusion Support Center at https://www.vmware.com/support/fusion.html.

Take Advantage of Fusion Online Resources

Go to the Fusion Support Center for product news, FAQs, more resources, and the online community.

To learn about available Fusion support offerings, registering a product, or creating a technical support request, see the Fusion Support Center at https://www.vmware.com/support/fusion.html.

You can also find information about using Fusion at the following self-help sources:

- Join the VMware Fusion Community at https://communities.vmware.com/community/vmtn/fusion. The VMware Fusion Community is where Fusion users can exchange information, questions, and comments to get the most out of Fusion.
- The VMware Knowledge Base provides troubleshooting information, solutions to error messages, and some best practice information for most VMware products. To find information on a specific problem you encounter in Fusion, select **VMware Fusion** in the product list and search for your problem by key word at http://kb.vmware.com.

- For answers to frequently asked questions about Fusion, go to http://www.vmware.com/products/fusion/faqs.html.

Understanding Fusion 2

Fusion harnesses virtualization to give you a powerful tool to run PC applications and devices on your Mac.

This chapter includes the following topics:

- Virtual Machines and What Fusion Can Do
- Navigating and Taking Action by Using the Fusion Interface

Virtual Machines and What Fusion Can Do

With Fusion, you can run virtual machines inside your Mac, which gives you access to a wide range of Windows and other x86 operating systems and applications.

What Is a Virtual Machine?

A virtual machine is a software computer that, like a physical computer, runs an operating system and applications.

A virtual machine typically contains a display, a hard disk or disks, one or more processors, memory, a CD/DVD drive, a network adapter, and a USB controller. All of these components are virtualized. That is, these elements of a virtual machine are all created by software and stored in files on your Mac.

The virtual machine runs in a window on your Intel-based Mac. You install an operating system and applications in the virtual machine and operate it as you would a physical computer. An operating system cannot distinguish between a virtual machine and a physical machine, nor can applications or other computers on a network. What you can do with a physical machine (install software, save files, add additional drives, and so on) you can do with a virtual machine.

Virtual machines are fully supported by Fusion with the underlying physical hardware. For example, you can configure a virtual machine with virtual components that are completely different from the physical components that are present on the underlying hardware. Virtual machines on the same physical host can run different kinds of operating systems (Windows, Linux, macOS, and others).

Fusion Capabilities

With Fusion, you can create, open, and run VMware virtual machines, and use PC-specific hardware with a Mac.

With Fusion, you can perform the following tasks:

- Run x86 operating systems, including Windows, Linux, macOS, and others, on macOS without rebooting.
- Run Windows and Linux applications on your Intel-based Mac.
- Run most Windows 3D applications that require DirectX 9 or DirectX 10 on your Mac.
- Import virtual machines created with Parallels Desktop, Microsoft Virtual PC for Mac, or virtual machines that use the OVF (Open Virtualization Format) standard.
- Migrate your physical Windows PC to a Fusion virtual machine with the integrated Migration Assistant.
- Access USB devices, such as video cameras and high-speed disks, from a virtual machine.
- Drag files between your Intel-based macOS host machine and virtual machines running other x86 operating systems.
- Fusion works with VMware virtual machines created with different VMware products. For more information, see Virtual Machine Compatibility

Supported Guest Operating Systems

Fusion supports more than 100 guest operating systems, including most versions of Windows, Linux, Mac OS X, OS X, and macOS.

For guest operating system support, visit http://www.vmware.com/go/hcl

You can also go to the VMware Web site and click the **Support** tab. Under Support Resources, click the **Compatibility Guides** link.

Virtual Hardware Specifications

Each virtual machine has a standard virtual hardware configuration for chip set, BIOS, ports, and so on. The amount of memory and number of processors depends on your Mac.

Processor

- One virtual processor on a host system with one or more logical processors
- Up to eight virtual processors (eight-way virtual symmetric multiprocessing, or Virtual SMP™) on a host system with at least four logical processors
- The following configurations have two logical processors:
  - A multiprocessor Mac with two or more physical CPUs
  - A single-processor Mac with a multicore CPU

Chip Set

- Intel 440BX-based motherboard

- NS338 SIO
- 82093AA IOAPIC

BIOS

- PhoenixBIOS 4.0 Release 6 with VESA BIOS

Memory

- Up to 64 GB, depending on the available memory on your Mac, virtual machine hardware version, and guest operating system support
- Total memory available for all virtual machines is limited only by the amount of memory on the Mac

Note If you assign too much memory to your virtual machines and have them all running at the same time, your Mac might slow down because of heavy disk swapping. As a best practice, make sure the total memory that Fusion and all running virtual machines uses stays below 70 percent of your total Mac memory.

Graphics

- VGA
- SVGA
- 128MB 3D accelerated video with DirectX 9.0c with Shader Model 3 and OpenGL 2.1 for Windows XP as the guest OS
- 256MB 3D accelerated video with DirectX 9.0EX with Aero and OpenGL 2.1 for Windows Vista and later as the guest OS
- 3D accelerated video with DirectX 10 with OpenGL 3.3 for Windows Vista and later as the guest OS. DirectX 10 requires OSX 10.10 or later on the host and hardware version 12 and later. DirectX 10 also requires a GPU version of Intel HD4000 or later, Nvidia GeForce 650M or later, or AMD Radeon HD 5750 or later. The VMware guest operating system OpenGL driver for Windows and Linux supports the OpenGL 3.3 core profile only. The OpenGL3.3 compatibility profile is not supported.
- To use the `GL_EXT_texture_compression_s3tc` and `GL_S3_s3tc` Open Graphics Library (OpenGL) extensions in a Windows XP or Windows 7 or later guest operating system, you must install Microsoft DirectX End-User Runtime in the guest operating system. OpenGL is an application program interface that is used to define 2D and 3D computer graphics. You can download Microsoft DirectX End-User Runtime from the Microsoft Download Center Web site.

IDE Devices

- Up to four devices. Any of these devices can be a virtual hard disk or CD/DVD drive
- IDE virtual disks up to 8 TB
- CD/DVD drive can be a physical device on the host or client system, or an ISO image file or a DMG image file

SATA Devices

- Up to 120 SATA devices: 4 controllers and 30 devices per controller
- SATA virtual disks up to 8 TB

SCSI Devices

- Up to 60 devices. Any of these devices can be a virtual hard disk or CD/DVD drive
- SCSI virtual disks up to 8 TB
- LSI Logic LSI53C10xx Ultra320 SCSI I/O controller. For Windows XP guest systems, this requires an add-on driver from the LSI Logic Web site. On the Web site, select Support & Downloads, click the link for downloading drivers, and select the controller in the drop-down menu to find the driver to download.
- Mylex (BusLogic) BT-958 compatible host bus adapter. For Windows XP and Windows Server 2003 guest systems, this requires an add-on driver from the VMware Web site. See http://www.vmware.com/download/fusion/drivers_tools.html.

NVMe Devices

- Up to 60 NVMe devices: 4 controllers and 15 devices per controller
- The following guest operating systems do not support virtual NVMe hard disks by default.
  - Windows operating systems prior to Windows 8.1
  - Mac operating systems prior to macOS 10.13
  - Some Linux operating systems

    Several Linux operating systems support NVMe while others do not. Check with the operating system vendor.

Printers

- Driver-free printing. Automatic replication of host printers in guest virtual machines, including PCL and PostScript printers
- Local and network-attached printers

Floppy Drives

- Up to two 1.44MB floppy devices
- Virtual floppy devices use floppy image files only

Serial (COM) Ports

- Up to four serial (COM) ports
- Virtual serial ports support only output to a file

- One serial port can be used for driver-free printing

Parallel (LPT) Ports

- Up to three bidirectional parallel (LPT) ports
- Virtual parallel ports support only output to a file

USB Ports

- Supports high-speed USB 2.0 and super-speed USB 3.0
- Supports most devices, including USB printers, scanners, PDAs, hard disk drives, memory card readers and digital cameras, as well as streaming devices such as webcams, speakers, and microphones

Keyboard

- 104-key Windows 95/98 enhanced

Mouse and Drawing Tablets

- PS/2 mouse
- USB mouse
- USB drawing tablets

Ethernet Card

- Up to 10 virtual Ethernet cards are supported.

Virtual Networking

- Three virtual hubs are configured by default for bridged, host-only, and NAT networking.
- Support for most Ethernet-based protocols, including TCP/IP v4, Microsoft Networking, Samba, Novell NetWare, and Network File System.
- Built-in NAT supports client software using TCP/IP v4, FTP, DNS, HTTP, WINS, and Telnet, including VPN support for PPTP over NAT.
- Create additional virtual networks to create isolated logical networks. This feature is available only with Fusion Pro.
- Support for IPv6 for NAT only applies to additional virtual networks, and is available only with Fusion Pro.

Sound

- Sound output and input using the Mac default input and output settings.
- Emulates Creative Labs Sound Blaster ES1371 AudioPCI sound card. MIDI input, game controllers and joysticks are not supported.

- HDAudio

Solid-State Drives

If your host machine has a physical solid-state drive (SSD), the host informs guest operating systems they are running on an SSD.

This allows the guest operating systems to optimize behavior. How the virtual machines recognize SSD and use this information depends on the guest operating system and the disk type of the virtual disk (SCSI, SATA, IDE, or NVMe).

- On Windows 8, Windows 10, Ubuntu, and Red Hat Enterprise Linux virtual machines, all drive types can report their virtual disks as SSD drives.

  Note
  - NVMe virtual hard disks are natively supported for Windows 8.1 and later.
  - To create a new a virtual machine with a Windows 7 or Windows 2008 R2 guest operating system using NVMe as the virtual hard disk, apply the appropriate Windows hot fix. See https://support.microsoft.com/en-us/kb/2990941.
  - Several Linux operating systems support NVMe while others do not. Check with the operating system vendor.

- On Windows 7 virtual machines, only IDE and SATA virtual disks can report their virtual disks as SSD. SCSI virtual disks only report as SSD when used as a system drive in a virtual machine, or as a mechanical drive when used as a data drive inside a virtual machine.
- On Mac virtual machines, only SATA and NVMe virtual disks are reported as SSD. IDE and SCSI virtual disks are reported as mechanical drives.

  Note NVMe virtual hard disks are supported for macOS 10.13 and later.

Use the virtual machine operating system to verify your virtual machine is using SSD as its virtual disk.

Navigating and Taking Action by Using the Fusion Interface

With Fusion interface elements, you can access your virtual machines and manage Fusion.

VMware Fusion Toolbar

You can use icons on the toolbar to initiate actions or change settings.

You can use the VMware Fusion toolbar to change the state of the virtual machine (for example, power on, suspend, reboot), access its snapshots, or view and change settings for the virtual machine.

You can see the VMware Fusion toolbar in the virtual machine window in Single Window view and in the Virtual Machine Library based on your selection to show or hide the toolbar in the **View** menu. See Show or Hide the Fusion Toolbar.

Perform Actions on Your Virtual Machines from the Virtual Machine Library Window

The **Virtual Machine Library** window shows the virtual machines you created or powered on in Fusion.

Procedure

1 To access the **Virtual Machine Library** window, select **Window > Virtual Machine Library** .

2 To perform an action with an existing virtual machine or to create a virtual machine, follow the appropriate instruction.

Option	Action
Start a virtual machine	Click the play button on the thumbnail image of the virtual machine.
Suspend a virtual machine	Select the thumbnail image of the virtual machine and click the suspend button in the toolbar.
Add notes about a virtual machine	Select the virtual machine and click **Virtual Machine > Get Info**. Type notes in the **Notes** text box of the General settings for the virtual machine.
Obtain specific information about the virtual machine (Fusion Pro only)	The following information is available in the Virtual Machine Library window. ■ Virtual machine processor and memory information. To access the Processors & Memory settings window, click the information icon. ■ Network information appears when the virtual machine is connected to a network and powered on with VMware Tools installed. To obtain more detailed network information, click the information icon. ■ Hard disk, snapshot, and reclaimable information. Reclaimable information is listed for Windows virtual machines only. Click the **Refresh disk space** icon to update the hard disk, snapshot, and reclaimable information and to prompt the **Clean Up Recommended** message to appear, if applicable.
Clean up a non-encrypted virtual machine (Fusion Pro only)	The **Clean Up Recommended** message appears for a non-encrypted virtual machine when the virtual machine is powered off and a significant amount of virtual machine space is available to be freed. To initiate the cleanup, click the message. The General settings dialog box appears, which includes cleanup options you can select.
Rename a virtual machine	a Control-click the virtual machine. b Select **Rename**. c Type a new name and press Enter.
Determine the location of a virtual machine's files	a Control-click the virtual machine. b Select **Show in Finder**.
Change the settings for a virtual machine	To open the Settings window for that virtual machine, select **Virtual Machine > Settings**. Some settings can be changed only when the virtual machine is powered off.

Option	Action	
Add virtual machines to the Virtual Machine Library window	You can add one or more virtual machines at a time to the Virtual Machine Library window	
	Manual	Drag the virtual machine package icons or the virtual machines' `.vmx` files to the window.
	Automated	1 Select **File > Scan for Virtual Machines**. 2 Click **+**. 3 Select a folder. 4 Click **Open**. 5 Click **Scan**.
Remove a virtual machine from the Virtual Machine Library window	a Shut down or power off the virtual machine. b Control-click the virtual machine. c Select **Delete**. Removing a virtual machine from the Virtual Machine Library window is not the same as deleting the virtual machine from your hard disk.	
Create a new virtual machine, import a virtual machine, or migrate a physical computer	Use the **File** menu to create a new virtual machine, import a virtual machine, or migrate a PC.	

Using the Home Pane to Create a Virtual Machine or Obtain One from Another Source

You can create a virtual machine, or migrate a physical PC.

Power On the Boot Camp Partition as a Virtual Machine

You can use the contents of your Boot Camp partition at the same time that you are running your Mac operating system. To do so, you use Fusion to power on the Boot Camp partition as a virtual machine.

Boot Camp is Apple software that enables an Intel-based Mac to run Windows operating systems. Boot Camp requires you to choose between Mac or Windows at boot time. Boot Camp creates separate Mac and Windows partitions on your hard disk to create a dual-boot environment. When you use your Windows Boot Camp partition as a Fusion virtual machine, you can perform the following tasks:

- Use your Boot Camp virtual machine and your Mac without rebooting and switching between them.
- Share files between your Boot Camp virtual machine and your Mac, through shared folders, dragging files, or cutting and pasting text.

Note Windows reactivation complications can occur if you do not install VMware Tools. In such a case, if you reactivate Windows in your Boot Camp virtual machine, and subsequently boot your Boot Camp partition natively, you will be prompted to reactivate Windows. Reactivating Windows in your native Boot Camp partition will result in your Boot Camp virtual machine requiring reactivation the next time you power it on, and so forth. Installing VMware Tools solves this problem.

Prerequisites

You must have a Boot Camp partition in place before you start this procedure.

You must have **administrator** privileges to use the Boot Camp partition as a virtual machine.

Procedure

1. Select **Window > Virtual Machine Library**.
2. In the **Virtual Machine Library** window, click the Boot Camp thumbnail in the list of virtual machines, which identifies the partition that Fusion detected.
3. (Optional) Type your Mac password to access the Boot Camp partition.

   Fusion creates a virtual machine that uses your Boot Camp partition and starts Windows.
4. Follow the onscreen instructions and restart your virtual machine when prompted.

   After Windows boots from your Boot Camp virtual machine, Fusion starts the installation of VMware Tools. VMware Tools enables full virtual machine functionality and optimizes performance for your Boot Camp partition when you use the partition as a virtual machine.
5. When the VMware Tools installation is complete, reboot your computer.

What to do next

The first time you power on your Boot Camp virtual machine after you install VMware Tools, you must reactivate Windows.

Using the Fusion Applications Menu

The applications menu is accessible on your Mac desktop when the virtual machine is in Unity view. The applications menu provides you with quick access to virtual machine applications, guest operating system functions, and Fusion functions.

With the Fusion applications menu, you can think about your virtual computing environment in terms of applications rather than virtual machines. The applications menu is a single source for finding every application on the virtual machine.

The applications menu is only available when you use Unity view as your working environment. You can access the contents of the Windows start menu when the taskbar is not visible. You can also access the **Virtual Machine** and **View** menu when Fusion is not the active application.

- Set Up the Applications Menu

  You can configure the Fusion applications menu for quick access to applications.
- Find a Guest Application by Using the Applications Menu

  You can find and open any virtual machine application from the applications menu. The applications menu is accessible in the Mac Dock when the virtual machine is in Unity view.

Set Up the Applications Menu

You can configure the Fusion applications menu for quick access to applications.

To access the applications menu, Fusion must be in Unity view. The applications menu provides quick access to applications you add when you configure the applications menu and to applications you recently opened.

The applications menu also provides access to Fusion functions, such as the power commands and the views, and certain Windows functions, such as the `run` command.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under System Settings in the **Settings** window, click **Applications Menu**.

4 (Optional) Add items to the applications menu.

   a To see the applications and other items available in the virtual machine, click the add (**+**) button.

   b Click, shift-click, or ⌘-click the items to appear in the applications menu and click **Add**.

5 (Optional) Use the mouse to select and move application-menu items up or down to reorder them.

6 (Optional) Remove items from the applications menu.

   a Select the item in the list to remove.

   b Click the remove (**-**) button.

Find a Guest Application by Using the Applications Menu

You can find and open any virtual machine application from the applications menu. The applications menu is accessible in the Mac Dock when the virtual machine is in Unity view.

The applications menu provides quick access to applications you add when you configure the applications menu, see Set Up the Applications Menu, and applications you recently opened.

Prerequisites

With the virtual machine open in single window or full screen view, switch to Unity view. For example, select **View > Unity**.

When you switch to Unity view, the following events occur.

- The virtual machine interface disappears.
- Applications currently open in the virtual machine appear directly on the Mac desktop.
- VMware Unity ( ) appears in the Mac Dock.

Procedure

1 Click VMware Unity ( ) in the Mac Dock.

   The VMware Unity applications menu appears in the Mac menu bar and a window opens that contains the applications menu.

The applications menu lists recently used applications. Depending on the operating system, it also displays applications listed in a start menu or applications menu for that virtual machine.

2 In the list, find the application to open.

3 (Optional) If the application name does not appear in the list, you can show more applications.

- Click **All Programs**.
- Type the name of the application in the search field.

4 To open the application, click the icon.

Using Different Views in the Fusion Interface

You can view the Fusion interface in Single Window view, Full Screen view, and Unity view. These views enable you to work with your applications and virtual machines in different ways.

Use Single Window View to Have Your Virtual Machine Appear in a Single Window on the Mac Desktop

In Single Window view, the virtual machine appears in a single window that you can resize and move with the mouse.

In Single Window view, you can see and use the VMware Fusion toolbar.

- Switch to Single Window View

  To see the Mac desktop and the virtual machine desktop at the same time, switch to Single Window view.

- Return to Another View from Single Window View

  To have the desktop of your virtual machine fill your display or set of displays, or to see a guest application in a window on the Mac desktop, exit Single Window view.

Switch to Single Window View

To see the Mac desktop and the virtual machine desktop at the same time, switch to Single Window view.

In Single Window view, the virtual machine appears in a single window that you can resize and move with the mouse.

Procedure

- Switch to Single Window view.
  - In Full Screen view with the Full Screen title bar, select **View > Single Window**.
  - In Full Screen view without the Full Screen Minibar, use the keyboard shortcut ⌘+Control+F to switch to Single Window view.
  - In Unity view, use the keyboard shortcut ⌘+Shift+U to switch to Single Window view.

Return to Another View from Single Window View

To have the desktop of your virtual machine fill your display or set of displays, or to see a guest application in a window on the Mac desktop, exit Single Window view.

Procedure

- To have the desktop of your virtual machine fill your entire display or set of displays, from the VMware Fusion menu bar, select **View > Full Screen**.
- To display guest application windows directly on your Mac desktop without seeing the virtual machine's desktop, select **View > Unity**.

Use Unity View to Display Guest Applications Directly on a Mac Desktop

To work with your virtual machine applications from the Mac desktop without the Fusion interface, use Unity view.

In Unity view, your virtual machine's window is hidden and VMware Unity appears in the Mac Dock. When you open virtual machine applications, those applications also appear in the Mac Dock. You can use the virtual machine applications just as you use your native Mac applications.

- About Unity View

  Unity view is supported in several Windows operating systems, and enables you to use many Mac functions with your guest applications.

- Switch to Unity View

  You can switch to Unity view from an application open in another view.

- Use the Waiting for Unity Window to Interact with the Guest Operating System

  Some operating system activities that require a response do not appear in Unity view. Fusion displays the **Waiting for Unity** window to enable you to respond.

- View the Windows Taskbar and System Tray in Unity View

  You can have the Windows taskbar or system tray visible while in Unity view.

- Connect a USB Device in Unity View

  You must manually connect USB devices when your virtual machine is running in Unity view.

- Switch to Another View From Unity View

  To see the desktop of the virtual machine, you can switch from Unity view to Single Window view or Full Screen view.

About Unity View

Unity view is supported in several Windows operating systems, and enables you to use many Mac functions with your guest applications.

Unity view is fully supported in virtual machines running Windows XP, Windows Vista, Windows 7, Windows 8, and Windows 10. Unity view is experimentally supported in virtual machines running Windows Server 2003 (32-bit and 64-bit), 2008, 2012, and 2016.

You can use the ⌘ + C, ⌘ + X, and ⌘ + V Mac keyboard shortcuts to copy, cut, and paste text between your Mac applications and virtual machine applications displayed in Unity view. You can also use the Mission Control feature with virtual machine applications in Unity view, and you can use ⌘ + Tab to switch between applications.

To use a virtual machine application, click the application in the Mac Dock, which launches Fusion and opens the application.

The following Mac features are supported with virtual machine applications.

- Keep virtual machine applications in the Mac Dock after you power off your virtual machine and quit Fusion. See Keep a Windows Application in the Mac Dock.
- Set virtual machine applications to open when you start up your Mac and log in. See Set a Virtual Machine Application to Open When You Log in to Your Mac.

Switch to Unity View

You can switch to Unity view from an application open in another view.

Prerequisites

Unity view works only if VMware Tools is installed in the virtual machine.

Procedure

1. In your Windows XP, Windows Vista, Windows 7, Windows 8, or Windows 10 virtual machine, open the applications to use in Unity view.
2. Switch to Unity View using one of the following methods:
   - From the **View** menu, select **Unity**.
   - Use the keyboard shortcut ⌘+Shift+U.
   - Click the **Switch to Unity view** icon in the tool bar of the virtual machine window.

   The virtual machine window is hidden. The open applications are displayed in windows on the Mac desktop and as icon tiles in the Mac Dock.

What to do next

To exit Unity view, click the Fusion icon in the Mac Dock and select **View > Single Window** or **View > Full Screen**.

Use the Waiting for Unity Window to Interact with the Guest Operating System

Some operating system activities that require a response do not appear in Unity view. Fusion displays the **Waiting for Unity** window to enable you to respond.

Procedure

- In the **Waiting for Unity** window, follow prompts to respond to the dialog boxes.

  When you are finished responding, the virtual machine returns to Unity view.

- Respond to the virtual machine's operating system by exiting Unity view.
  a Click **Exit Unity**.
  b Perform any activities that the guest operating system requires.
  c To return to Unity view, select **View > Unity**.

View the Windows Taskbar and System Tray in Unity View

You can have the Windows taskbar or system tray visible while in Unity view.

Procedure

- Show the taskbar by selecting **View > Show Taskbar in Unity**.

  You might have to move the location of the Mac Dock to see the taskbar.

  The Hide System Tray menu item is dimmed.
- Hide the taskbar by selecting **View > Hide Taskbar in Unity**.
- Show the system tray by selecting **View > Show System Tray in Unity**.
- Hide the system tray by selecting **View > Hide System Tray in Unity**

When they are set to show, these elements also remain visible when you switch to work in non-Windows applications.

Connect a USB Device in Unity View

You must manually connect USB devices when your virtual machine is running in Unity view.

Note Fusion does not support USB adapters for connecting displays to your virtual machines.

Procedure

1. Plug the USB device into your Mac.

   The selection dialog appears.
2. Select the system to which you want to connect the device.

   The action you take depends on how many virtual machines are open.

Option	Description
If you have one virtual machine powered on	Select **Connect to Mac** or **Connect to *OS of your open virtual machine***.
If you have two or more virtual machines powered on	In the pop-up menu, select **Connect to your Mac** or **Connect to *virtual machine name*** for the selected virtual machine. Click **OK**.

Switch to Another View From Unity View

To see the desktop of the virtual machine, you can switch from Unity view to Single Window view or Full Screen view.

Prerequisites

Fusion must be the active application, so that the Fusion menu appears at the top of the display.

Procedure

- Exit Unity view.

Option	Action
Have your virtual machine appear in a single window on the Mac desktop.	From the VMware Fusion menu bar, select **View > Single Window**.
Have the desktop of your virtual machine fill your entire display or set of displays.	From the VMware Fusion menu bar, select **View > Full Screen**.

The open applications appear in the Fusion virtual machine window.

Use Full Screen View To Make Your Virtual Machine Desktop Fill Your Display

In Full Screen view, Fusion fills your entire display or set of displays with the desktop of your virtual machine.

In this view you do not see the Mac Dock. You can show or hide the VMware Fusion menu bar. This view looks as if you are using a machine dedicated to running your guest operating system. You have access to the toolbar by moving the cursor to the top of the display to reveal the toolbar. Optionally, a subset of Fusion functions are available via the compact Full Screen Minibar.

- Switch Fusion to Full Screen View

  You can switch to Full Screen view from another view.

- Hide the VMware Fusion Menu Bar in Full Screen View

  When you are in Full Screen view, the VMware Fusion menu bar hides until you hover the cursor at the top of the Full Screen display. You can set the VMware Fusion menu bar to hide all the time.

- Set the Full Screen Minibar

  When you are in Full Screen view, you can use the Full Screen Minibar to access some virtual machine controls such as state change and some **Virtual Machine** menu options.

- Return to Another View from Full Screen View

  To see the Mac desktop and the virtual machine desktop at the same time, or to see a guest application in a window on the Mac desktop, switch to Unity view or Single Window view.

Switch Fusion to Full Screen View

You can switch to Full Screen view from another view.

Procedure

- Switch to Full Screen view.
  - Click the **Enter Full Screen** button in the toolbar at the top of the virtual machine window.
  - From the **View** menu, select **Full Screen**.
  - Use the ⌘**+Control+F** keyboard shortcut to switch to Full Screen view.

The Fusion virtual machine window expands to fill the full screen (or screens if you have multiple displays and have Fusion configured to use them all). When possible, a new space is created for easy navigation using Mission Control.

Hide the VMware Fusion Menu Bar in Full Screen View

When you are in Full Screen view, the VMware Fusion menu bar hides until you hover the cursor at the top of the Full Screen display. You can set the VMware Fusion menu bar to hide all the time.

The Full Screen menu bar behavior applies to running virtual machines.

Procedure

- Set the **Hide Menu Bar in Full Screen** option.
  - Select **View > Hide Menu Bar in Full Screen**.
  - Use the ⌘ **+ Shift +M** keyboard shortcut to hide or show the VMware Fusion menu bar in Full Screen view.

Set the Full Screen Minibar

When you are in Full Screen view, you can use the Full Screen Minibar to access some virtual machine controls such as state change and some **Virtual Machine** menu options.

In Full Screen view, the virtual machine window expands to fill the full screen, or screens if you are using multiple displays. In this view you do not see the Mac Dock. However, you can access some **Virtual Machine** menu options by using the Full Screen Minibar. The Full Screen Minibar contains the Fusion suspend and run button for the virtual machine, some virtual machine options, and the return to Single Window view button.

Procedure

1. Select **View > Full Screen**.

   The virtual machine view changes to Full Screen view and the Full Screen Minibar appears on the right side of the screen by default.

2 Select the button in the Minibar with the gear icon and set the Full Screen Minibar behavior from the **Full Screen Minibar** menu.

Option	Description
Always Show	The Full Screen Minibar is always visible.
Automatically Hide and Show	For running virtual machines, the Full Screen Minibar is visible if you move the pointer over its position at the edge of the display. For virtual machines that are not running, the Full Screen Minibar always appears.
Always Hide	The Full Screen Minibar never appears. Use the ⌘**+Control+F** keyboard shortcut to exit Full Screen view.
Position on Screen	Set where the Full Screen Minibar appears: **Top**, **Left**, **Bottom**, or **Right** edge. You can also drag and drop the Full Screen Minibar to different positions in a single display or you can drag it to another display if you have more than one display.

Note The Full Screen Minibar can be moved to a different side of the display by dragging.

Return to Another View from Full Screen View

To see the Mac desktop and the virtual machine desktop at the same time, or to see a guest application in a window on the Mac desktop, switch to Unity view or Single Window view.

To have your virtual machine appear in a single window on the Mac desktop, exit to Single Window view. To display guest application windows directly on your Mac desktop without seeing the virtual machine's desktop, exit to Unity view.

Procedure

- To exit Full Screen to Single Window view, in the Full Screen title bar, select **View > Single Window**, or use the keyboard shortcut ⌘+Control+F.
- To exit Full Screen to Unity view, in the Full Screen title bar, select **View > Unity**, or use the keyboard shortcut ⌘+Shift+U.

Resize the Virtual Machine Display to Fit

You can force the virtual machine display to fit the current screen or window size.

This option is disabled when the virtual machine is in Unity view or when the virtual machine display cannot be resized.

Procedure

- Select **View > Resize Virtual Machine to Fit**

  The virtual machine display is resized to fit the current screen or window.

Using Multiple Displays

Fusion supports multiple displays. Fusion detects up to ten displays and can automatically adjust when displays are plugged in or unplugged, and change in resolution and orientation.

Use Multiple Displays in Unity View

Fusion detects multiple displays by default. You can drag a window in Unity view to any available display without having to change settings.

For multiple displays and virtual machines in Unity view, do not use the display settings within the guest operating system. Fusion does not support any changes made there.

Use All Displays in Full Screen View

You can set Fusion Full Screen view to use all of the displays attached to your Mac.

Procedure

1. Select **View > Use All Displays in Full Screen** if **Use Single Display in Full Screen Mode** is enabled.

   Use All Displays in Full Screen is not supported for Mac OS X guests.

2. Select **View > Full Screen** if you are in another view.

Move Full Screen View to One of Multiple Displays

When you have multiple displays, you can specify one of them to use Full Screen view for a Fusion virtual machine.

You can have a virtual machine to run in Full Screen view on a single display out of many, rather than use all of the displays. You can have different virtual machines in Full Screen view on different monitors.

Procedure

1. In the menu bar, select **View > Single Window** if you are in another view.
2. Drag the Fusion virtual machine window to the display you want to use for Full Screen view.
3. (Optional) In the menu bar, select **View > Use Single Display in Full Screen** if Fusion is set to use all displays in Full Screen view.
4. In the menu bar, select **View > Full Screen**.

   The Fusion virtual machine window fills the specified display.

Configuring Fusion

3

You can configure Fusion so that it looks and works in ways that fit your needs.

This chapter includes the following topics:

- Setting Fusion Preferences
- Customizing the Fusion Display
- Keep a Windows Application in the Mac Dock
- Set a Virtual Machine Application to Open When You Log in to Your Mac
- Contents of the Virtual Machine Package
- Work with Virtual Machine Packages

Setting Fusion Preferences

You can set preferences that control the behavior of Fusion.

Set General Preferences

You can set how your mouse works, how your virtual machines behave when you quit Fusion, and other general operations.

Procedure

1. Select **VMware Fusion > Preferences**.
2. Click **General**.

3 In the When closing a virtual machine section, select how Fusion behaves when you close a virtual machine.

Option	Description
Suspend the virtual machine	The virtual machine is suspended when you close the virtual machine window. If you close a virtual machine window with this preference selected, when you next open the virtual machine, it restarts with applications running and files open much as they would be after you suspended and resumed a laptop computer.
Power off the virtual machine	The virtual machine is powered off when you close the virtual machine window.
Confirm before closing	Fusion opens a dialog box that asks for confirmation before closing the virtual machine window. To run virtual machines in the background, you must select this option.

4 In the Gaming section, select a setting that fits how you expect to use your mouse.

Option	Description
Auto-detect Mouse for Games	Fusion detects when it needs to lock a mouse to a virtual machine window for correct operation during gaming. If no game is detected, the mouse works in the normal fashion. This is the default setting.
Never Optimize Mouse for Games	In some cases, the autodetect function can detect nongame applications as games. Use this option to turn autodetect off so that the mouse can work in the normal fashion for these applications.
Always Optimize Mouse for Games	In some cases, the autodetect function fails to recognize a game. Use this option to have correct mouse operation for gaming in this instance.

5 (Optional) In the Updates section, select the **Automatically check for updates** check box to have Fusion check for software updates when it starts.

A message alerts you when a new version of Fusion is available to download and install. If you do not select the **Automatically check for updates** check box, you can check for updates manually at any time by selecting **VMware Fusion > Check for Updates**.

Select a Keyboard and Mouse Profile

Fusion provides standard keyboard and mouse profiles for each language it supports.

You can assign each virtual machine its own profile.

Procedure

1 Select **VMware Fusion > Preferences** and click **Keyboard & Mouse**.

2 Select a profile from the **Keyboard & Mouse Profile** drop-down menu.

3 Select **Edit Profiles**.

4 (Optional) Add or remove a profile using the add (**+**) button and the delete (**-**) button.

5 Click **Done**.

Set Key Mappings on the Keyboard and Mouse Preferences Pane

You can map certain key combinations on your Mac keyboard to keys on your virtual machine.

The following mappings are supported:

- Key to Key
- Set of Modifiers to Modifier
- Set of Modifiers + Key to Key

You cannot stack key mappings. You cannot create one key mapping and include that key mapping as part of another key mapping.

Procedure

1. Select **VMware Fusion > Preferences** and click **Keyboard & Mouse**.
2. Click **Key Mappings** to go to the Key Mappings pane.
3. Select the **Enable Key Mappings** check box.
4. (Optional) Select the **Enable Language Specific Key Mappings** check box if you want to incorporate key mappings related to the keyboard layout for the language you selected in the Input Menu (as shown by the flag icon in the menu bar).

   When you change the Input Menu to a supported keyboard layout, additional key mappings are appended to the key mapping list. Fusion supports U.K. English, Belgian, Danish, French, Swiss French, and German. This feature is not available for Mac OS X Server virtual machines.
5. Change the key mapping settings.

Option	Description
Turn a key mapping on or off	Click the check box to the left of the Mac Shortcut.
Edit a key mapping	Double-click the Mac Shortcut or Virtual Machine Shortcut to change and make that change in the Edit Key Mapping dialog.
Add a key mapping	Click the add (**+**) button and define the new key mapping in the Edit Key Mapping dialog.
Delete a key mapping	Select the key mapping and click the remove (**-**) button.
Restore the default settings	Click **Restore Defaults**.

Set Mouse Shortcuts on the Keyboard and Mouse Preference Pane

In Fusion, you can use shortcuts to operate a single-button mouse as a two-button or three-button mouse.

The defaults are Control + primary button to mimic the secondary mouse button (right-click) and ⌘ + primary button to mimic a third button.

You can change the shortcut.

Procedure

1 Select **VMware Fusion > Preferences** and click **Keyboard & Mouse**.

2 Click **Mouse Shortcuts** to go to the Mouse Shortcuts pane.

3 Double-click the mouse shortcut and hold down the keys for the new shortcut.

To restore the defaults, click **Restore Defaults**.

Enable or Disable Mac Host Shortcuts on the Keyboard and Mouse Preference Pane

By default in Fusion, global keyboard shortcuts that the Mac operating system or third-party applications have registered are sent to the Mac operating system instead of your virtual machine.

Examples of global Mac keyboard shortcuts include Command-Tab (switch applications) and F9, F10, and F11 (Exposé commands). You set these shortcuts and commands in the macOS System Preferences.

You can use the Mac Host Shortcuts pane to disable all these shortcuts while you use Fusion. This action applies only to Single Window view and Full Screen view. In Unity view, all macOS shortcuts are always enabled.

Procedure

1 Select **VMware Fusion > Preferences** and click **Keyboard & Mouse**.

2 To go to the Mac Host Shortcuts pane, click **Mac Host Shortcuts** .

3 To enable or disable all shortcuts, select or deselect the **Enable Mac OS Host Keyboard Shortcuts** check box.

4 To customize how the virtual machine maps the Mac Command key (⌘) to the Windows command key, select the option from the drop-down menu.

Option	Description
Either Command Key	Use either Mac Command key to map to the Windows command key.
Left Command Key	Use the left Mac Command key to map to the Windows command key.
Right Command Key	Use the right Mac Command key to map to the Windows command key.

The macOS commands are not editable here. You must change them in the macOS System Preferences.

Enable Fusion Shortcuts on the Keyboard and Mouse Preference Pane

Fusion has several keyboard shortcuts for Fusion commands when you are in Single Window view or Full Screen view. You can enable or disable these shortcuts in Fusion Preferences.

Procedure

1 Select **VMware Fusion > Preferences** and click **Keyboard & Mouse**.

2 Click **Fusion Shortcuts** to go to the Fusion shortcuts pane.

3 Select or deselect an item in the list.

Set Fusion Display Resolution Preferences

You can set preferences for how Fusion virtual machines appear in both single window mode and full screen mode.

These preferences apply by default to all of your virtual machines. You can change these settings for specific virtual machines. For more information, see Configuring Display Resolution Settings.

Procedure

1 Select **VMware Fusion > Preferences**.

2 Select **Display**.

3 Select the **Single Window** resolution setting.

This setting specifies how all virtual machines appear in single window mode.

Option	Description
Stretch the virtual machine in the window	When the virtual machine window is resized, the virtual machine display is stretched to fill the window with the resolution unchanged.
Resize the virtual machine and the window	The virtual machine display is resized to fit the single window.

4 Select the **Full Screen** resolution setting.

This setting specifies how all virtual machines appear in full screen mode.

Option	Description
Center the virtual machine in the screen	When the virtual machine enters Full Screen view mode, the virtual machine display is centered on the screen with the resolution unchanged.
Stretch the virtual machine in the screen	When the virtual machine enters Full Screen view mode, the virtual machine display is stretched to fill the screen space with the resolution unchanged.
Resize the virtual machine to fit the screen	The virtual machine display is resized to fit the full screen.

Set Default Applications Preferences

You can set applications from the Mac or the virtual machines to be used to open different categories of URLs.

You can open the following categories of URLs:

- RSS feeds (feed)
- File transfers (FTP, SFTP)
- Web pages (HTTP, HTTPS)

- Mail (mailto)
- VMRC (VMware Remote Console)
- Newsgroups (news)
- Remote sessions (Telnet, SSH)

If you make a Web browser the default from within a virtual machine, the default setting for how Fusion handles URLs does not change. The next time you start or resume the virtual machine, or change the URL preferences, the Fusion settings overwrite the changes that you make in the guest machine.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under System Settings in the **Settings** window, click **Default Applications**.
4. Click **Configure**.
5. Set or change the preference.

Option	Description
Add a category of URL to the Default Applications pane	Click the add (**+**) button and select a URL category from the pop-up menu.
Set or change an application to use to open a category of URL	Select an application from the pop-up menu to the right of the appropriate **Open [category] with** check box. You can select from all available applications on your Mac and in your virtual machines.
Remove a URL category	Click the remove (**-**) button to the right of the pop-up menu for the category.

Creating Custom Networks

With Fusion Pro, you can change key networking settings, add and remove virtual custom networks, create custom virtual networking configurations, and require the virtual machine to prompt for confirmation before allowing the network adapter to run in promiscuous mode. The changes that you make affect all virtual machines that connect to the custom network running on the host system.

You can create custom networks to accomplish the following tasks:

- Add additional NAT configurations for scenarios in which a virtual machine shares the IP address and MAC address of your Mac.
- Add additional virtual private network (VPN) configurations between virtual machines and the host system.

For either type of custom network, you can specify which subnet is used by Fusion and whether to connect a physical network on the host system to the custom network.

Add a NAT Configuration

With Fusion Pro, you can add additional NAT configurations for scenarios in which a virtual machine shares the IP address and MAC address of your Mac.

By default, Fusion provides one **Share with my Mac** configuration that uses NAT. You can add additional NAT configurations to perform actions such as turning off the DHCP service or using a non-default subnet IP or subnet mask.

Prerequisites

- Verify that you have a Fusion Pro license.
- Verify that you know the administrator password.

Procedure

1. Select **VMware Fusion > Preferences** and click **Network**.
2. Click the lock icon, enter the administrator password, and click **OK**.
3. Click the plus sign (+) under the list of networks.
4. (Optional) If you want to rename a virtual network, double-click the name, enter a new name, and press Return.
5. Allow virtual machines on the network to use NAT to connect to external networks.
   a. Select **Allow virtual machines on this network to connect to external networks (using NAT)**.
   b. (Optional) Select the **Enable IPv6** check box.
   c. (Optional) Use the appropriate option to configure the **IPv6 Prefix** text box.

Option	Description
Manual	Enter the IPv6 prefix in the text box.
Automatic	Leave the text box blank to allow an IPv6 prefix to generate automatically.

d (Optional) Click the plus sign (+) under the Port Forwarding section for each port-forwarding configuration you want to add.

e (Optional) For each port-forwarding configuration you add, provide the following information and click **OK**.

Host port	A port number available on the Mac host. Verify that the port does not conflict with ports used by existing port forwarding entries.
Type	The appropriate protocol to use.
Virtual Machine IP address	The IP address of the virtual machine to which you want to forward the incoming requests.
Virtual Machine Port	The port number to use for requests on the specified virtual machine. The port might be the standard port, such as 80 for HTTP, or a nonstandard port if software running in the virtual machine is configured to accept requests on a nonstandard port.

A port-forwarding configuration appears in the list of networks.

6 (Optional) To connect the host system to this private network, select **Connect the host Mac to this network**.

7 (Optional) If you enabled IPv6 and want the Mac host to use IPv6 to communicate with virtual machines, manually add an IPv6 address to the NAT virtual network interface.

Note On Mac systems, the NAT virtual network interface does not automatically accept IPv6 address assignments.

a Open a terminal window on your Mac.

b Enter a command such as the following.

```
sudo ifconfig VirtualNetworkInterfaceName inet6 IPv6Prefix::1 up
```

Where *VirtualNetworkInterfaceName* is a placeholder for the name of the virtual network interface, such as vmnet2, and *IPv6Prefix::1* is a placeholder for the IPv6 prefix, which has a format such as xxxx:xxxx:xxxx:xxxx::1.

8 (Optional) To use a local DHCP service to distribute IP addresses to virtual machines on the network, select **Provide addresses on this network via DHCP**.

9 (Optional) To change the subnet IP address or subnet mask, modify the addresses in the **Subnet IP** and **Subnet Mask** text boxes.

10 Click **Apply**.

The network that you configured is now available to the virtual network adapters associated with virtual machines on your Mac.

Add a Private Network Configuration

With Fusion Pro, you can add additional virtual private network (VPN) configurations between virtual machines and the host system.

Multiple virtual machines configured with this type of host-only networking are on the same network. The VMware DHCP server can provide addresses on the network.

You might want to set up multiple private networks on the same computer in the following situations:

- To have two virtual machines connected to one private network, and other virtual machines connected to another private network to isolate the network traffic on each network
- To test routing between two virtual networks
- To test a virtual machine that has multiple network interface cards, without using any physical network adapters

Prerequisites

- Verify that you have a Fusion Pro license.
- Verify that you know the administrator password.

Procedure

1. Select **VMware Fusion > Preferences** and click **Network**.
2. Click the lock icon, type the administrator password, and click **OK**.
3. Click the plus sign (+) under the list of networks.
4. Verify that the following check box is not selected: **Allow virtual machines on this network to connect to external networks (using NAT)**.
5. (Optional) To connect a physical network on the host system to this private network, select **Connect the host Mac to this network**.
6. (Optional) To use a local DHCP service to distribute IP addresses to virtual machines on the network, select **Provide addresses on this network via DHCP**.
7. (Optional) To change the subnet IP address or subnet mask, modify the addresses in the **Subnet IP** and **Subnet Mask** text boxes.
8. Click **Apply**.

The network that you configured is now available to the virtual network adapters associated with virtual machines on your Mac.

Enable Dictation

Dictation allows you to use your voice instead of typing. You must enable Dictation in Fusion to use it with guest operating systems.

Procedure

1. Select **VMware Fusion > Preferences** and click **Keyboard & Mouse**.
2. Select a profile to use from the **Keyboard & Mouse Profile** drop-down menu.
3. Click **Mac Host Shortcuts** to go to the Mac Host Shortcuts pane.

4 Make note of how your virtual machine maps the Command key to the Windows key.

5 Assign a hot key to start dictation in the virtual machine.

Join or Leave the Customer Experience Improvement Program

The VMware Customer Experience Improvement Program (CEIP) provides information to VMware. VMware uses the information to improve its products and services, to fix problems, and to advise you on how best to deploy and use VMware products.

VMware Fusion participates in the VMware CEIP. Information about the data collected through CEIP and how VMware uses it are in the Trust & Assurance Center at http://www.vmware.com/trustvmware/ceip.html.

The CEIP appears the first time you launch Fusion after you install the product. You must then make a selection. You can change your selection any time afterwards.

Procedure

1 Launch Fusion.

2 Select **VMware Fusion > Preferences**.

3 Click **Feedback**.

4 Join or leave the CEIP depending on the participation preference currently selected.

Option	Description
Join	Select **Join the VMware Customer Experience Improvement Program.**
Leave	Deselect **Join the VMware Customer Experience Improvement Program.**

Customizing the Fusion Display

You can customize the Fusion display to fit the way you work with virtual machines.

- Show or Hide the Fusion Toolbar

  If you prefer working on your Mac without toolbars hidden when you aren't using them, you can hide the Fusion toolbar in the virtual machine window.

- Customize the Fusion Toolbar

  You can add or remove icons from the toolbar.

- Resize the Fusion Display and Resolution

  You can use the mouse to resize the virtual machine window.

Show or Hide the Fusion Toolbar

If you prefer working on your Mac without toolbars hidden when you aren't using them, you can hide the Fusion toolbar in the virtual machine window.

Procedure

- Click **View > Show/Hide Toolbar**.

Customize the Fusion Toolbar

You can add or remove icons from the toolbar.

Prerequisites

You must use Single Window view to customize the toolbar.

Procedure

1. Select **View > Customize Toolbar**.

   The list of all the tools available for the toolbar appears.
2. Drag tools between the list and the toolbar.

   Use the **Show** pop-down menu to set the toolbar display to **Icon & Text**, **Icon Only**, or **Text Only**.
3. Click **Done**.

Resize the Fusion Display and Resolution

You can use the mouse to resize the virtual machine window.

Prerequisites

Changing the display resolution by resizing the window works only if VMware Tools is installed and is up to date in the virtual machine.

Procedure

- With the pointer over the resize control at the lower-right corner of the virtual machine window, hold down the primary mouse button and drag the handle to resize the window.

The display resolution adjusts to the new window size.

Keep a Windows Application in the Mac Dock

You can place an icon tile for a Windows application in your Mac Dock. You can open the application in the same way that you open your Mac applications. You can access your virtual machine's applications without having to use the VMware Fusion menu bar or the guest operating system interface.

Procedure

1. With the application open, switch to Unity view by selecting **View > Unity**.

   The application appears in the Mac Dock.
2. Control-click or right-click the application in the Mac Dock and select **Options > Keep in Dock**.

Set a Virtual Machine Application to Open When You Log in to Your Mac

For convenience, you might want to have an application on your virtual machine open whenever you start your Mac.

Procedure

1 With the application open, switch to Unity view by selecting **View > Unity**.

The application appears in the Mac Dock.

2 Control-click or right-click the application in the Mac Dock and select **Options > Open at Login**.

Contents of the Virtual Machine Package

The files that describe a virtual machine are bundled in a package in macOS.

Virtual machine files have different functions, as shown in Table 3-1. Some of these files, like the lock files, are created when the virtual machine runs.

Table 3-1. Files in the Virtual Machine Package

File	Description
Virtual disk file(s) `*.vmdk`	This can be a single large file or many 2GB portions, depending on how you set up your disk and if you have snapshots.
Configuration file `*.vmx`	A plain text file describing the virtual machine, such as which files it uses, how much RAM it gets, and a variety of other settings.
BIOS file `*.nvram`	This contains information such as the virtual machine's boot order.
Log file `vmware.log`	This is a plain text file that contains information on the most recent run of the virtual machine. The next-most-recent is called vmware-0.log, then vmware-1.log, and finally vmware-2.log. If you ever have a problem with Fusion, you might be asked to provide this file.
Lock files `*.lck`	These files are created for the configuration and disk files when the virtual machine is running.
Memory files `*.vmem`	Snapshot files are an example of memory files.

Work with Virtual Machine Packages

When you create a virtual machine, Fusion stores the virtual machine files as a single package. This feature lets you move an entire virtual machine as a single entity.

A package (sometimes called a bundle) has the extension `.vmwarevm`. When you move the package, all virtual machine files are included.

You might need to access the virtual machine package files during troubleshooting.

Note Editing the configuration file can cause problems. Make a backup copy of the file before you make any changes.

Prerequisites

Fusion must not be running during virtual machine file editing.

Procedure

1. In the Finder, select the virtual machine package.

   By default, virtual machine packages are located in *your home folder*/Documents/Virtual Machines.

2. Control-click or right-click the package and select **Show Package Contents**.
3. Perform one of the following tasks.
   - Copy the log file (vmware.log) to provide for troubleshooting analysis.
   - Open the configuration file (*.vmx) in a text editor to modify it. You can find instructions for how to modify the file in the Fusion release notes or from appropriate support personnel.

Creating Virtual Machines

4

You can create virtual machines, import virtual machines created elsewhere, and migrate virtual machines converted from physical PCs. If you have Fusion Pro, you can also clone existing virtual machines.

This chapter includes the following topics:

- Create a Virtual Machine
- Upload a Virtual Machine to a Remote Server
- Download a Virtual Machine from a Remote Server
- Migrate an Existing Physical PC to a Virtual Machine
- Importing Windows Virtual Machines
- Export a Virtual Machine to OVF Format
- Installing and Using VMware Tools
- Cloning Virtual Machines with Fusion Pro

Create a Virtual Machine

How you create a virtual machine depends on its guest operating system. Virtual machines created using Fusion 6 and later are created with SATA virtual disks or CD drives.

- Creating a Microsoft Windows Virtual Machine

  You can create a virtual machine that uses a Microsoft Windows operating system as its guest operating system.

- Creating a Linux Virtual Machine in Fusion

  You can create a virtual machine that uses a Linux distribution as its guest operating system.

- Creating a macOS Virtual Machine in Fusion

  You can install Mac OS X, OS X, or macOS in a virtual machine. Fusion creates the virtual machine, opens the operating system installation assistant, and installs VMware Tools. VMware Tools loads the drivers required to optimize a virtual machine's performance.

- Creating a Shared Virtual Machine in Fusion

  You can create a shared virtual machine in Fusion that can be accessed by all users on the local Mac host.

- Create a Virtual Machine from a Mac Recovery Partition

  You can use the recovery partition on your Mac to create virtual machines running macOS.

- Create a Virtual Machine on a Remote Server

  You can create a virtual machine on a remote server, but certain requirements must be met for the server.

- Create a Virtual Machine for Any Supported Operating System

  You can create a virtual machine with a guest operating system that does not have an Easy Install option if the guest operating system is supported by Fusion.

- Power On the Boot Camp Partition as a Virtual Machine

  You can use the contents of your Boot Camp partition at the same time that you are running your Mac operating system. To do so, you use Fusion to power on the Boot Camp partition as a virtual machine.

- Activate Windows in a Virtual Machine

  In some cases you must activate Windows when you create, import, or migrate a virtual machine.

Creating a Microsoft Windows Virtual Machine

You can create a virtual machine that uses a Microsoft Windows operating system as its guest operating system.

Fusion creates your virtual machine, selects the default Windows installation options, and installs VMware Tools, which loads the drivers required to optimize your virtual machine's performance.

You can also allow Windows Easy Install to make your home folder available to Windows as a shared folder. This feature provides you with options, such as sharing files between the virtual machine and your Mac.

Windows Easy Install is available for the following Windows operating systems:

- Windows 10, Windows 8, Windows 7, Windows Vista, and Windows XP
- Windows Server 2016, Windows Server 2012, Windows Server 2008, Windows Server 2003, and Windows 2000 Server

Note You must provide the operating system software and its product key. Fusion does not include any operating system or license.

If you are not using one of these Windows operating systems in your virtual machine, or if you are using Windows but want to install the operating system manually, you can use the procedure for creating a virtual machine for any supported operating system.

Create a Virtual Machine by Using Windows Easy Install

When you create a Microsoft Windows virtual machine, you can use the Fusion Windows Easy Install feature to install the Windows operating system you supply and to install VMware Tools in your virtual machine.

Prerequisites

- If you are installing the guest operating system from an image file, verify that the ISO image file is in a directory that is accessible to the host system.
- If you are installing the guest operating system from a physical disc, insert the operating system installation disc into your Mac.

Important Fusion does not include any operating systems to install in virtual machines that you create. You must obtain the operating system and any necessary product keys.

Procedure

1 Select **File > New**.

A dialog box appears with the **Select the Installation Method** panel showing.

2 Click **Continue**.

3 Select the disc or ISO image.

Option	Description
ISO image file	a Click **Use another disc or disc image**, browse to the `.iso` file for the operating system, and click **Open** to identify the file. b Select the file from the list in the Create a New Virtual Machine window, and click **Continue**.
Physical disc	Select the disc you inserted into the Mac from the list and click **Continue**. If the disc does not appear in the list, click **Use another disc or disc image** and browse to the location of the disc.

4 In the **Microsoft Windows Easy Install** panel, select the **Use Easy Install** option, provide the appropriate information, and click **Continue**.

- **Display Name** or **Account Name**

  For Windows XP and earlier, the entry in the **Display Name** text box appears in Info windows as the name your Windows software is registered to. It is not the Windows user name.

- **Password** (optional)

  The entry in the **Password** text box is the password for the Windows administrator account only.

- **Windows Product key**

  Fusion does not provide the product key. The product key is included in the materials from the Windows operating system vendor.

5 In the **Integration** panel, indicate how basic file sharing is handled in the new virtual machine.

Option	Description
More Seamless	Fusion shares the documents and applications on your Mac with Windows. Files on your Mac that Windows supports open in Windows. Windows can modify your Mac's documents, so install and regularly update Windows antivirus software.
More Isolated	Fusion does not share the documents and applications on your Mac with Windows. To copy files between your Mac and Windows, use drag and drop.

You can change these settings after the virtual machine is created by selecting **Virtual Machine > Settings** and using the Sharing panel.

6 In the **Finish** panel, you can use default settings or customize the settings before powering on the virtual machine to start the operating system installation.

Option	Action
To create the virtual machine according to the specifications listed in the Finish panel	a Click **Finish**. b Indicate the folder in which to save the virtual machine. The default is your *user*/Documents/Virtual Machines folder. c (Optional) To share the virtual machine with other users on the Mac host, save the virtual machine to the Shared folder and select the **Share this virtual machine with other users on this Mac** check box. Deselect the check box to save to the Shared folder but not share the virtual machine with other users on the Mac host. See Creating a Shared Virtual Machine in Fusion.
To change disk size or other standard settings of the virtual machine	a Click **Customize Settings**. b Save the new virtual machine. c Make changes to the virtual machine's disk size, processor usage, removable devices, and other configurations on the **Settings** window.

Fusion starts the new virtual machine, installs the operating system, and installs VMware Tools.

Create a Virtual Machine by Using Windows Easy Install and a Disc Image File

When you create a Microsoft Windows virtual machine, you can use the Fusion Windows Easy Install feature to install the Windows operating system you supply and to install VMware Tools in your virtual machine.

Prerequisites

Important Fusion does not include any operating systems to install in virtual machines that you create. You must obtain the operating system and any necessary product keys.

Procedure

1 Select **File > New**.

A dialog box appears with the **Select the Installation Method** panel showing.

2 Click **Continue**.

3 Click **Use another disc or disc image**, browse for the `.iso` file for the operating system, and click **Open** to identify the file.

4 Select the file from the list in the Create a New Virtual Machine window, and click **Continue**.

5 In the **Microsoft Windows Easy Install** dialog box, select the **Use Easy Install** option, provide the appropriate information, and click **Continue**.

- **Display Name** or **Account Name**

  For Windows XP and earlier, the entry in the **Display Name** field appears in Info windows as the name your Windows software is registered to. It is not the Windows user name.

- **Password** (optional)

  The entry in the **Password** field is the password for the Windows administrator account only.

- **Windows Product key**

  Fusion does not provide the product key. The product key is included in the materials from the Windows operating system vendor.

6 In the Integration panel, indicate how basic file sharing is handled in the new virtual machine.

Option	Description
More Seamless	Fusion shares the documents and applications on your Mac with Windows. Files on your Mac that Windows supports open in Windows. Windows can modify your Mac's documents, so install and regularly update Windows antivirus software.
More Isolated	Fusion does not share the documents and applications on your Mac with Windows. To copy files between your Mac and Windows, use drag and drop.

You can change these settings after the virtual machine is created by selecting **Virtual Machine > Settings > Sharing**.

7 In the **Finish** panel, you can use default settings or customize the settings before powering on the virtual machine to start the operating system installation.

Option	Action
To create the virtual machine according to the specifications listed in the Finish panel	a Click **Finish**. b Indicate the folder in which to save the virtual machine. The default is your *user*/Documents/Virtual Machines folder. c (Optional) To share the virtual machine with other users on the Mac host, save the virtual machine to the Shared folder and select the **Share this virtual machine with other users on this Mac** check box. Deselect the check box to save to the Shared folder but not share the virtual machine with other users on the Mac host. See Creating a Shared Virtual Machine in Fusion.
To change disk size or other standard settings of the virtual machine	a Click **Customize Settings**. b Save the new virtual machine. c Make changes to the virtual machine's disk size, processor usage, removable devices, and other configurations on the **Settings** window.

Fusion starts the new virtual machine, installs the operating system, and installs VMware Tools.

Creating a Linux Virtual Machine in Fusion

You can create a virtual machine that uses a Linux distribution as its guest operating system.

Fusion creates your virtual machine, selects the default Linux installation options, and installs VMware Tools, which loads the drivers required to optimize your virtual machine's performance. You can also have Linux Easy Install make your home folder available to Linux as a shared folder, so that you can share files between the virtual machine and your Mac.

Linux Easy Install is available for the following operating systems:

- Ubuntu 7.10 and later
- Ubuntu Server Edition 8.10 and later
- Red Hat Enterprise Linux 3 and later
- SUSE Linux Enterprise Desktop/Server 10 and later
- Open SUSE 11.3 and later

If you are not using one of these Linux operating systems in your virtual machine, or if you are using Linux but want to install the operating system manually, you can use the procedure for creating a virtual machine for any supported operating system.

Create a Virtual Machine by Using Linux Easy Install and an Installation CD

When you create a Linux virtual machine, you can use the Fusion Linux Easy Install feature to install the Linux operating system you provide and to install VMware Tools in your virtual machine.

Prerequisites

You must obtain the operating system installation image. Fusion does not include any operating systems to install in virtual machines that you create.

Procedure

1. Select **File > New**.

   A dialog box appears with the **Select the Installation Method** panel showing.

2. Insert the operating system installation CD into your Mac.

   Fusion detects it and asks for confirmation that it is the operating system to install.

3. If it is the correct operating system, ensure that **Install this operating system** is selected and click **Continue** to go to the Linux Easy Install panel.

4 In the **Linux Easy Install** dialog box, select the **Use Easy Install** option, provide the appropriate information, and click **Continue**.

   a Enter your **Display Name**, **Account Name**, and **Password**.

   b Select **Make your home folder accessible to the virtual machine** to have Linux Easy Install configure your home folder as a shared folder, so you can share files between the virtual machine and your Mac.

5 (Optional) If you selected to make your home folder accessible, select either **Read only** or **Read & Write** for your virtual machine.

6 In the **Finish** panel, you can use default settings or customize the settings before powering on the virtual machine to start the operating system installation.

Option	Action
To create the virtual machine according to the specifications listed in the Finish panel	a Click **Finish**. b Indicate the folder in which to save the virtual machine. The default is your *user*/Documents/Virtual Machines folder. c (Optional) To share the virtual machine with other users on the Mac host, save the virtual machine to the Shared folder and select the **Share this virtual machine with other users on this Mac** check box. Deselect the check box to save to the Shared folder but not share the virtual machine with other users on the Mac host. See Creating a Shared Virtual Machine in Fusion.
To change disk size or other standard settings of the virtual machine	a Click **Customize Settings**. b Save the new virtual machine. c Make changes to the virtual machine's disk size, processor usage, removable devices, and other configurations on the **Settings** window.

Fusion starts the new virtual machine, installs the operating system, and installs VMware Tools.

Create a Virtual Machine by Using Linux Easy Install and an Image File

When you create a Linux virtual machine, you can use the Fusion Linux Easy Install feature to install the Linux operating system you provide and to install VMware Tools in your virtual machine.

Prerequisites

You must obtain the operating system installation image. Fusion does not include any operating systems to install in virtual machines that you create.

Procedure

1 Select **File > New**.

   A dialog box appears with the **Select the Installation Method** panel showing.

2 Click **Continue**.

3 Click **Use another disc or disc image**, browse for the `.iso` file for the operating system, and click **Open** to identify the file.

4 Select the image in the **Create a New Virtual Machine** panel and click **Continue**.

5 In the **Linux Easy Install** dialog box, select the **Use Easy Install** option, provide the appropriate information, and click **Continue**.

   a Enter your **Display Name**, **Account Name**, and **Password**.

   b Select **Make your home folder accessible to the virtual machine** to have Linux Easy Install configure your home folder as a shared folder, so you can share files between the virtual machine and your Mac.

6 If you selected to make your home folder accessible, select either **Read only** or **Read & Write** for your virtual machine.

7 In the **Finish** panel, you can use default settings or customize the settings before powering on the virtual machine to start the operating system installation.

Option	Action
To create the virtual machine according to the specifications listed in the Finish panel	a Click **Finish**. b Indicate the folder in which to save the virtual machine. The default is your *user*/Documents/Virtual Machines folder. c (Optional) To share the virtual machine with other users on the Mac host, save the virtual machine to the Shared folder and select the **Share this virtual machine with other users on this Mac** check box. Deselect the check box to save to the Shared folder but not share the virtual machine with other users on the Mac host. See Creating a Shared Virtual Machine in Fusion.
To change disk size or other standard settings of the virtual machine	a Click **Customize Settings**. b Save the new virtual machine. c Make changes to the virtual machine's disk size, processor usage, removable devices, and other configurations on the **Settings** window.

Fusion starts the new virtual machine, installs the operating system, and installs VMware Tools.

Creating a macOS Virtual Machine in Fusion

You can install Mac OS X, OS X, or macOS in a virtual machine. Fusion creates the virtual machine, opens the operating system installation assistant, and installs VMware Tools. VMware Tools loads the drivers required to optimize a virtual machine's performance.

Mac OS X, OS X, or macOS virtual machines that you create in Fusion can run on any Apple-branded hardware that uses Intel processors. The Apple licensing agreement defines the situations when it is permissible to virtualize Mac OS X, OS X, or macOS. Fusion does not change these terms or enable macOS on non-Apple hardware. You cannot use a Mac OS X, OS X, or macOS virtual machine in another VMware product, such as Workstation Pro.

Fusion supports the following Mac server and client versions for the guest operating system:

- Mac OS X Server 10.5, 10.6
- Mac OS X 10.7

- OS X 10.8, 10.9, 10.10, 10.11
- macOS 10.12, 10.13

Fusion does not support the following features for Mac OS X virtual machines:

- Multiple displays
- 3D Accelerated graphics
- Unity view

To install the operating system, use the procedure for creating a virtual machine for any supported operating system. See Create a Virtual Machine for Any Supported Operating System.

Creating a Shared Virtual Machine in Fusion

You can create a shared virtual machine in Fusion that can be accessed by all users on the local Mac host.

When a virtual machine is created in Fusion, it is saved to the default `/Documents/Virtual Machines` folder. This folder has limited permissions that allow only the creator of the virtual machine to use it. To allow other users on the Mac host to access the virtual machine, save it to the `/Users/Shared` folder on the Mac.

With a shared virtual machine, the user can log out of the current account on the Mac host, and another user on the Mac host can log in to access the virtual machine.

The **Run Windows applications from your Mac's Applications folder** option is not available on shared virtual machines.

Important Shared virtual machines in Fusion work differently than shared virtual machines in Workstation Pro. In Workstation Pro, a shared virtual machine is a virtual machine on the host system that remote Workstation Pro users can access as a remote virtual machine. In Fusion, shared virtual machines can be accessed only on the local Mac host.

Create a Virtual Machine from a Mac Recovery Partition

You can use the recovery partition on your Mac to create virtual machines running macOS.

Prerequisites

- You must have a recovery partition on your Mac to create this kind of virtual machine.
- You must have Mac OS X 10.11 or later.

Procedure

1. Select **File > New**.

   A dialog box appears with the **Select the Installation Method** panel showing.

2. Click **Install macOS from the recovery partition**.

3 Select a recovery partition and click **Continue**.

If you have more than one recovery partition, a list of partitions is presented from which to choose.

4 Provide information about the virtual machine.

a In the **Where** text box, indicate the folder in which to save the virtual machine.

The default location is your *user*/Documents/Virtual Machines folder. You do not need to save the virtual machine on the same disk as the recovery partition.

b To enable the virtual machine to be shared with other users on the Mac host, save the virtual machine to the Shared folder and select the **Share this virtual machine with other users on this Mac** check box.

c Click **Save**.

5 In the **Finish** panel, you can use default settings or customize the settings before powering on the virtual machine to start the operating system installation.

Option	Action
To create the virtual machine according to the specifications listed in the Finish panel	■ Click **Finish**.
To change disk size or other standard settings of the virtual machine	a Click **Customize Settings**. b Make changes to the virtual machine's disk size, processor usage, removable devices, and other configurations on the **Settings** window.

Create a Virtual Machine on a Remote Server

You can create a virtual machine on a remote server, but certain requirements must be met for the server.

Prerequisites

- You have login credentials for the server where you want to create the virtual machine.
- The server is defined in the Virtual Machine Library.
- Sufficient space exists on the server to accommodate the virtual machine.
- The remote server is running VMware Workstation Pro, VMware ESXi or VMware vCenter Server.
- Confirm that the firmware type with which you plan to configure the virtual machine is supported by the guest operating system. See Configure a Firmware Type.

Important Fusion does not include operating systems to install in virtual machines that you create. You must obtain the operating system and any necessary product keys.

Procedure

1 Select **File > New**.

A dialog box appears with the **Select the Installation Method** panel showing.

2 Click **Create a virtual machine on a remote server**.

3 Click **Continue**.

4 Select the server from the list in the **Choose a Server** window, and click **Continue**.

5 (Optional) If the server supports folders, select a folder location for the virtual machine and click **Continue**.

6 Select the host and datastore from the **Choose a Host and Datastore** window, and click **Continue**.

7 Select a hardware version from the **Choose a Hardware Version** drop-down menu, and click **Continue**.

8 Select a network option for the virtual machine.

Option	Description
Custom	To configure a network connection for the virtual machine, use the **Custom** drop-down menu to select a network option.
Do not use a network connection	To create the virtual machine without a network connection, select the **Do not use a network connection** option.

9 Select the guest operating system for the virtual machine and click **Continue**.

10 Select the firmware type and click **Continue**.

11 Configure the virtual disk by creating a virtual disk or use an existing virtual disk. If you create a virtual disk, use the disk size slider to specify the size of the virtual disk and specify the bus type. Click **Continue**.

The **Finish** window appears.

12 (Optional) Change the name of the new remote virtual machine.

13 Click **Finish**.

The new remote virtual machine appears in Virtual Machine Library under the remote server.

Create a Virtual Machine for Any Supported Operating System

You can create a virtual machine with a guest operating system that does not have an Easy Install option if the guest operating system is supported by Fusion.

Prerequisites

- If you are installing the guest operating system from an image file, verify that the ISO image file is in a directory that is accessible to the host system.
- If you are installing the guest operating system from a physical disc, insert the operating system installation disc into your Mac.

Important Fusion does not include any operating systems to install in virtual machines that you create. You must obtain the operating system and any necessary product keys.

Procedure

1 Select **File > New**.

A dialog box appears with the **Select the Installation Method** panel showing.

2 Locate an operating system installation disc image file (ISO) and drag and drop it to **Install from disc or image**.

The **Create a New Virtual Machine** assistant starts.

3 Click **Continue**.

If you are installing a Windows or Linux operating system, the **Easy Install** panel appears.

4 (Optional) Deselect **Use Easy Install** and click **Continue** to skip this panel of the assistant.

5 In the **Finish** panel, you can use default settings or customize the settings before powering on the virtual machine to start the operating system installation.

Option	Action
To create the virtual machine according to the specifications listed in the Finish panel	a Click **Finish**. b Indicate the folder in which to save the virtual machine. The default is your *user*/Documents/Virtual Machines folder. c (Optional) To share the virtual machine with other users on the Mac host, save the virtual machine to the Shared folder and select the **Share this virtual machine with other users on this Mac** check box. Deselect the check box to save to the Shared folder but not share the virtual machine with other users on the Mac host. See Creating a Shared Virtual Machine in Fusion.
To change disk size or other standard settings of the virtual machine	a Click **Customize Settings**. b Save the new virtual machine. c Make changes to the virtual machine's disk size, processor usage, removable devices, and other configurations on the **Settings** window.

What to do next

After you install the operating system in the virtual machine, install VMware Tools.

Power On the Boot Camp Partition as a Virtual Machine

You can use the contents of your Boot Camp partition at the same time that you are running your Mac operating system. To do so, you use Fusion to power on the Boot Camp partition as a virtual machine.

Boot Camp is Apple software that enables an Intel-based Mac to run Windows operating systems. Boot Camp requires you to choose between Mac or Windows at boot time. Boot Camp creates separate Mac and Windows partitions on your hard disk to create a dual-boot environment. When you use your Windows Boot Camp partition as a Fusion virtual machine, you can perform the following tasks:

- Use your Boot Camp virtual machine and your Mac without rebooting and switching between them.

- Share files between your Boot Camp virtual machine and your Mac, through shared folders, dragging files, or cutting and pasting text.

Note Windows reactivation complications can occur if you do not install VMware Tools. In such a case, if you reactivate Windows in your Boot Camp virtual machine, and subsequently boot your Boot Camp partition natively, you will be prompted to reactivate Windows. Reactivating Windows in your native Boot Camp partition will result in your Boot Camp virtual machine requiring reactivation the next time you power it on, and so forth. Installing VMware Tools solves this problem.

Prerequisites

You must have a Boot Camp partition in place before you start this procedure.

You must have **administrator** privileges to use the Boot Camp partition as a virtual machine.

Procedure

1. Select **Window > Virtual Machine Library**.
2. In the **Virtual Machine Library** window, click the Boot Camp thumbnail in the list of virtual machines, which identifies the partition that Fusion detected.
3. (Optional) Type your Mac password to access the Boot Camp partition.

   Fusion creates a virtual machine that uses your Boot Camp partition and starts Windows.
4. Follow the onscreen instructions and restart your virtual machine when prompted.

   After Windows boots from your Boot Camp virtual machine, Fusion starts the installation of VMware Tools. VMware Tools enables full virtual machine functionality and optimizes performance for your Boot Camp partition when you use the partition as a virtual machine.
5. When the VMware Tools installation is complete, reboot your computer.

What to do next

The first time you power on your Boot Camp virtual machine after you install VMware Tools, you must reactivate Windows.

Activate Windows in a Virtual Machine

In some cases you must activate Windows when you create, import, or migrate a virtual machine.

When you install Windows on a computer, you must activate it to use it. You activate Windows either over the Internet or by phone with Microsoft Support. When the Windows operating system starts up, it checks to see if it is running on the same hardware on which it was originally installed. If the hardware has changed, the Windows operating system requires reactivation.

If you install Windows as a guest operating system in a new virtual machine, it requires activation the same as if you had installed it on a physical computer. If you import a virtual machine from another source, if you run the Boot Camp partition as a virtual machine, or if you migrate a physical PC to a virtual machine, Windows recognizes that the virtual hardware is different.

The type of license you have for your Windows operating system can affect how you activate Windows after you start to use it in a Fusion virtual machine.

- With an OEM license, Windows is tied directly to the hardware on which it was loaded by the manufacturer. Most pre-installed versions of Windows have OEM licenses. OEM licenses generally cannot be transferred to another computer, or to a virtual machine. If you use the Fusion Migrate Your PC feature to migrate one of these types of systems to a virtual machine, you might be required to purchase a second license (or product key) from Microsoft. If a second product key is required, you can get that through the Microsoft representative when you call Microsoft Support to activate the operating system now residing in the virtual machine.
- With a retail license, when you buy Windows from a vendor, the license enables you to change platforms as often as you want. In this case, you can reactivate Windows over the Internet, or by phone with Microsoft Support.
- With an enterprise license, you can move the operating system around freely.

Prerequisites

Install VMware Tools in the virtual machine before you activate Windows. VMware Tools keeps track of the activation keys. Without VMware Tools installed, you must reactivate Windows each time you start up the virtual machine.

Procedure

- Activate Windows online or by phone.

  The Help and Support item on the Windows Start menu enables you to find specific information about activation for that version of the operating system.

What to do next

If you have activation questions, contact Microsoft.

Upload a Virtual Machine to a Remote Server

When you upload a virtual machine to a remote server, Fusion Pro copies the virtual machine to the remote host and datastore that you select. The original virtual machine remains on the host system.

Prerequisites

Verify that the following conditions are met:

- You have login credentials for the server where you want to upload the virtual machine.
- The server is defined in the Virtual Machine Library.
- Sufficient space exists on the server to accommodate the virtual machine.
- The remote server is running VMware ESXi or VMware vCenter Server.
- The virtual machine is not encrypted. You cannot upload an encrypted virtual machine.
- The virtual machine is not powered on or suspended. It must be powered off.

Procedure

1. Select **File > Connect to Server**.
2. Enter the name of the host server or click the **Recent Servers** drop-down menu to select a server from the list.
3. Enter your login credentials and click **Connect**.
4. Select a virtual machine from the Virtual Machine Library.
5. Drag the virtual machine to the server.
6. In the **Upload Virtual Machine** dialog box, select a host and a datastore folder or shared folder.
7. Click **Upload**.

Download a Virtual Machine from a Remote Server

Your users can download a virtual machine from a remote server.

Prerequisites

Verify that the following conditions are met:

- You have login credentials for the server where you want to download the virtual machine.
- The server is defined in the Virtual Machine Library.
- Sufficient space exists on the Mac host to accommodate the virtual machine.
- The remote server is running VMware ESXi or VMware vCenter Server.
- The virtual machine is not powered on or suspended. It must be powered off.

Procedure

1. Select **File > Connect to Server**.
2. Enter the name of the host server or click the **Recent Servers** icon to select a server from the list of recently accessed servers.
3. Enter your login credentials and click **Connect**.
4. Select a virtual machine from the remote server.
5. Drag the virtual machine to the Virtual Machine Library.
6. Click **Save**.

Migrate an Existing Physical PC to a Virtual Machine

You can migrate your existing Windows PC onto your Mac. Fusion recreates your PC as a virtual machine, and you can continue to use your PC applications and files.

Prerequisites

- Migrate Your PC is supported for Windows operating systems from Windows XP up to and including Windows 10.
- Your Mac must be running Mac OS X 10.11 or later.

Procedure

1 Set Up Your Mac to Accept the Transfer of Files from Your PC

You must set sharing and firewall system preferences on your Mac to allow the transfer of files needed to create the virtual machine from the physical PC.

2 Connect to Your PC for Migration

You can choose what kind of connection with which to migrate your PC.

3 Disable UAC for Windows Vista and Later Before Migrating

To successfully migrate your PC to Fusion, you must disable User Account Control (UAC) before using the Migrate Your PC feature.

4 Install and Run the Fusion PC Migration Agent on Your PC

For your Mac to be able to connect to your physical PC and start the migration, you must install the Fusion PC Migration Agent on your PC.

5 Run the Migration Assistant on Your Mac

The Migration Assistant connects to your physical PC and performs the conversions and transfers of files necessary to create the virtual machine on your Mac.

6 Ensure that VMware Tools is Installed in the Migrated Virtual Machine

Install VMware Tools to enhance the performance of the guest operating system.

Set Up Your Mac to Accept the Transfer of Files from Your PC

You must set sharing and firewall system preferences on your Mac to allow the transfer of files needed to create the virtual machine from the physical PC.

Procedure

1 Select **System Preferences** in the Apple menu and click **Sharing** in the Internet & Network section.

2 Select **File Sharing**, and click **Options**.

3 Select **Share files and folders using SMB** for the appropriate accounts and click **Done**.

4 Click **Show All** to return to **System Preferences**.

5 Click **Security** in the Personal section and click **Firewall** to go to the Firewall panel.

6 Make sure incoming connections for SMB file sharing is allowed.

7 Close the **System Preferences** window.

What to do next

Determine how to connect your Mac to your physical PC.

Connect to Your PC for Migration

You can choose what kind of connection with which to migrate your PC.

You can migrate your PC over a direct connection, a wired network, or a wireless network.

Procedure

- Implement your preferred connection.

Option	Description
Direct connection	Use an ethernet cable or a firewire cable to connect your PC directly to your Mac. This provides the fastest connection.
Wired network	Connect your PC and your Mac to the same network using ethernet cables.
Wireless network	Connect your PC or Mac to a wireless network. The migration process is significantly slower over a wireless network. If you migrate over a wireless network, set the screen saver on your physical PC to wait longer than the migration will take. Right-click on the PC desktop and select **Properties**. Select the Screen Saver tab, set **Wait** to **9999**, and click **OK**.

What to do next

If your physical PC is running Windows Vista, Windows 7, Windows 8, or Windows 10, disable UAC on it before proceeding. Otherwise, load the PC Migration Agent on your physical PC.

Disable UAC for Windows Vista and Later Before Migrating

To successfully migrate your PC to Fusion, you must disable User Account Control (UAC) before using the Migrate Your PC feature.

Procedure

1. Open the **Control Panel** on your PC.
2. Select **User Accounts**.
3. Select **Change User Account Control Settings** and move the slider to **Never notify**.
4. Restart your PC.

What to do next

Install the Fusion PC Migration Agent on your physical PC.

Install and Run the Fusion PC Migration Agent on Your PC

For your Mac to be able to connect to your physical PC and start the migration, you must install the Fusion PC Migration Agent on your PC.

Prerequisites

If your Windows PC does not have a password, you must create a password before beginning the migration process. You can go to User Accounts in the Control Panel to create a password.

You must perform the migration on an Administrator account.

Procedure

1. Set the power options on your Windows physical PC so that your monitor and hard disks do not turn off automatically and your system does not go to standby.
   a. In the **Control Panel**, click **Power Options**.
   b. On the Power Schemes panel, set **Turn off monitor**, **Turn off hard drives**, and **System standby** to **Never**.
2. (Optional) If you migrate over a wireless connection, set your physical PC's screen saver to wait longer than the migration will take.
   a. Right-click on the PC desktop and select **Properties**.
   b. Select the Screen Saver tab, set **Wait** to **9999**, and click **OK**.
3. Download VMware Fusion PC Migration Agent from the Fusion product downloads page under Drivers and Tools.
4. Run the installer file.
5. Click **Next** on the installation wizard's welcome page, click **I accept the terms of the License Agreement** on the license agreement page, and click **Next**.
6. Select the folder in which you want to save the PC Migration Agent, and click **Next**.
7. Click **Install**.
8. Click **Finish**.
9. Restart your PC.

The **VMware Fusion PC Migration Agent** window appears on your PC, displaying the four-digit passcode needed for opening communications between your Mac and this PC.

The passcode is good only when the window is open. If you close the window and restart the Agent, or if you restart the PC, a new passcode replaces the old one.

What to do next

Leave the PC Migration Agent running so that the Migration Assistant on your Mac can communicate with it. See Run the Migration Assistant on Your Mac.

Run the Migration Assistant on Your Mac

The Migration Assistant connects to your physical PC and performs the conversions and transfers of files necessary to create the virtual machine on your Mac.

Prerequisites

- Your Mac and PC must be on the same network and remain powered on during the migration. Although you can migrate your PC over a wireless network, the process is significantly faster if you connect your Mac and PC with a network cable.
- The PC Migration Agent must be running on your PC and displaying a four-digit passcode.

Procedure

1. Select **File > Migrate Your PC**.

   The Migration Assistant appears.

2. Click **Continue**.

   The Connect to Your PC panel appears.

3. Type the four-digit passcode displayed by the PC Migration Agent on the PC and click **Continue**.
4. Type your user name and password for the PC, and click **Continue**.
5. Indicate where to save the new virtual machine on your Mac.

   Fusion saves virtual machines in your *user*/Documents/Virtual Machines folder by default. You can change the location by clicking **Choose** and using the Finder.

6. Click **Continue** to start the migration.

   The assistant displays a progress bar and an estimate of time remaining.

7. Click **Finish**.

Your PC is replicated in a virtual machine accessible from the Virtual Machine Library.

What to do next

Ensure that VMware Tools is installed on the virtual machine.

Ensure that VMware Tools is Installed in the Migrated Virtual Machine

Install VMware Tools to enhance the performance of the guest operating system.

Note Sometimes Windows finishes detecting changes before the VMware Tools installation is complete, and displays a dialog prompting you to restart. Do not restart until you are prompted by VMware Tools.

Prerequisites

The Migration Assistant has run, and a completed, but powered off, virtual machine appears in Single Window view.

Procedure

1 Start the virtual machine.

VMware Tools starts installing.

2 (Optional) Log in to Windows.

3 (Optional) Make the VMware Tools installation visible in Windows 8, Windows 7, and Windows Vista.

The VMware Tools installation dialog does not appear automatically in Windows 8, Windows 7, and Windows Vista.

a Click the Interactive Services Detection icon ( ).

b Click **View the message** in the **Interactive Services Detection** window.

4 When prompted by VMware Tools, restart the virtual machine.

What to do next

If the VMware Tools installation does not complete properly, install VMware Tools manually. See Installing and Using VMware Tools.

You might have to reactivate your Windows operating system in the new virtual machine when you power it on.

Importing Windows Virtual Machines

You can import into Fusion virtual machines that you created with Parallels Desktop, Microsoft Virtual PC, as well as virtual machines using the Open Virtualization Format (OVF).

Fusion can import virtual machines created with Parallels, Microsoft Virtual PC, or OVF.

When you import a Parallels or Virtual PC virtual machine, Fusion creates a VMware virtual machine based on the original virtual machine. The import process is nondestructive, so you can continue to use the original source virtual machine with the product you use to create the source virtual machine.

Fusion can also import the contents of the Boot Camp partition as a virtual machine, creating a completely new VMware virtual machine based on the partition. This is a separate entity, not tied to the partition like the virtual machine described in Power On the Boot Camp Partition as a Virtual Machine. You can then reclaim the space by deleting the Boot Camp partition, which restores the drive to a single volume.

Supported Guest Operating Systems for Import

A guest operating system is the system that runs in a virtual machine. Fusion supports importing Parallels and Virtual PC virtual machines with certain operating systems.

Fusion supports importing the following operating systems:

- Microsoft Windows 10
- Microsoft Windows 8

- Microsoft Windows 7
- Microsoft Windows Vista
- Microsoft Windows XP Service Pack 3
- Microsoft Windows XP Service Pack 2

Virtual machines must be powered off before you import them.

If your copy of Windows was not licensed with a volume-license key, you might need to reactivate it when it starts inside Fusion.

How Importing Affects Settings

You might have to modify the imported virtual machine, depending on settings and virtual hardware.

The imported VMware virtual machine contains an exact copy of the disk state from your source virtual machine, with the exception of some hardware-dependent drivers and sometimes the mapped drive letters. Imported virtual machines are created with IDE or SCSI virtual disks. You can manually change the disk to SATA or NVMe when the import process is complete.

Settings from the Source Computer

The following settings from the source computer remain identical:

- Operating system configuration (computer name, security ID, user accounts, profiles and preferences, and so on)
- Applications and data files
- The volume serial number of each disk partition

Because the target and the source virtual machines or system images have the same identities (name, SID, and so on), running both on the same network can result in conflicts. To redeploy the source virtual machine or system image, ensure that you do not run both the source and target images or virtual machines on the same network at the same time.

For example, if you use the Fusion Importer to test the viability of running a Parallels or Virtual PC virtual machine as a VMware virtual machine without first decommissioning the original non-VMware machine, you must resolve the duplicate ID problem first.

Changes to Virtual Hardware

Most imported applications should function correctly in the VMware virtual machine because their configuration and data files have the same location as the source virtual machine. Applications might not work if they depend on specific characteristics of the underlying hardware such as the serial number or the device manufacturer.

When you troubleshoot after a virtual machine import, notice the following potential hardware changes:

- CPU model and serial numbers (if activated) can be different after the import. They correspond to the physical computer hosting the VMware virtual machine.

- Ethernet adapter can be different (AMD PCNet or VMXnet) with a different MAC address. Each interface's IP address must be individually reconfigured.
- Graphics card can be different (VMware SVGA card).
- Numbers of disks and partitions are the same, but each disk device can have a different model and different manufacturer strings.
- Primary disk controllers can be different from the source machine's controllers.
- Applications might not work if they depend on devices that are not available from within a virtual machine.

Import a Parallels or Virtual PC Virtual Machine

You can import existing third-party virtual machines and run them in Fusion.

Procedure

1. Select **File > Import**.
2. Browse to the existing virtual machine you want to import and click **Open**.
3. Type the name for the imported virtual machine in the **Save As** field and indicate where to save it.

   The default destination is the Virtual Machines folder created by Fusion.

   Fusion displays the disk space needed for the import, and the space available on the current disk.
4. Click **Import**.

   When the import is complete, you see the virtual machine added to the virtual machine list, in the powered-off state.
5. Click **Finish**.

   Fusion installs VMware Tools after the virtual machine powers on, and reboots the system after the Tools installation is complete.

You have a separate Fusion version of the third-party virtual machine.

Import the Boot Camp Partition

You can import the Boot Camp partition as a virtual machine, creating a VMware virtual machine that copies the partition.

Procedure

1. Select **Window > Virtual Machine Library**.
2. In the **Virtual Machine Library** window, select **Boot Camp partition** and click **Import**.

3 Change the name for the imported virtual machine in the **Save As** field from the default **Boot Camp** to something unique, and indicate where to save it.

   The default destination is the Virtual Machines folder created by Fusion.

   Fusion displays the disk space needed for the import, and the space available on the current disk.

4 Click **Import**.

   When the import is complete, you see the virtual machine added to the virtual machine list, in the powered-off state.

5 Click **Finish**.

   Fusion installs VMware Tools after the virtual machine powers on, and reboots the system after the Tools installation is complete.

Import an Open Virtualization Format Virtual Machine

You can import an Open Virtualization Format (OVF) virtual machine and run it in Fusion. You can import both `.ovf` and `.ova` files.

Fusion converts the virtual machine from OVF format to VMware runtime (`.vmx`) format.

OVF is a platform-independent, efficient, extensible, and open packaging and distribution format for virtual machines. For example, you can import OVF virtual machines exported from Workstation Pro into Fusion. You can import OVF 1.x files only.

You can also use the standalone OVF Tool to convert an OVF virtual machine to VMware runtime format. For information about using the OVF Tool, see the *OVF Tool User Guide*.

Prerequisites

Download or copy the OVF virtual machine file (`.ovf` or `.ova` file) to a location that is accessible to your Mac.

Procedure

1 Select **File > Import**.

2 Click **Choose file** and browse to the `.ovf` or `.ova` file and click **Open**.

3 Type the name for the imported virtual machine in the **Save As** text box and indicate where to save it.

   The default destination is the Virtual Machines folder created by Fusion.

4 Click **Save**.

   Fusion performs OVF specification conformance and virtual hardware compliance checks. A status bar indicates the progress of the import process.

After the import is complete, the virtual machine appears in the virtual machine library and in a separate virtual machine window. The virtual machine is shut down.

Export a Virtual Machine to OVF Format

You can export a virtual machine from Fusion Pro to Open Virtualization Format (OVF). You can export both .ovf and .ova files.

Fusion Pro converts the virtual machine from VMware runtime (.vmx) format to OVF format.

OVF is a platform-independent, efficient, extensible, and open packaging and distribution format for virtual machines. OVF format provides a complete specification of the virtual machine, including the full list of required virtual disks and the required virtual hardware configuration. The virtual hardware configuration includes CPU, memory, networking, and storage. An administrator can quickly provision an OVF-formatted virtual machine with little or no intervention.

You can also use the standalone version of OVF Tool to convert a virtual machine that is in VMware runtime format to an OVF virtual machine. The standalone version of OVF Tool is installed in the Fusion Pro installation directory under `Contents/Library/VMware OVF Tool` . See the *OVF Tool User Guide* documentation on the VMware Web site for information about using OVF Tool.

Prerequisites

- Verify that the virtual machine is not encrypted. You cannot export an encrypted virtual machine to OVF format.
- Verify that the virtual machine is powered off.

Procedure

1. Select the virtual machine and select **File > Export to OVF**.
2. Enter a name for the OVF file and specify a directory in which to save it.
3. Specify whether to export the virtual machine as an OVF, a folder with separate files, or as an OVA, a single-file archive.
4. Click **Export** to start the OVF export process.

   The export process can take several minutes. A status bar indicates the progress of the export process.

Installing and Using VMware Tools

VMware Tools is a suite of utilities that enhances the performance of the virtual machine's guest operating system and improves management of the virtual machine.

For example, the following features are just some of the features that are available only if VMware Tools is installed:

- Significantly faster graphics performance and Windows Aero on operating systems that support Aero
- The Unity feature, which enables an application in a virtual machine to appear on the host desktop like any other application window
- Shared folders between host and guest file systems

- Copying and pasting text, graphics, and files between the virtual machine and the host or client desktop
- Improved mouse performance
- Synchronization of the clock in the virtual machine with the clock on the host or client desktop
- Scripting that helps automate guest operating system operations
- Enables guest customization for virtual machines.

Although the guest operating system can run without VMware Tools, you would lose important functionality and convenience.

You can use the Windows Easy Install or Linux Easy Install feature to install VMware Tools as soon as the operating system is finished installing.

In the case of Windows Easy Install or Linux Easy Install, Fusion installs VMware Tools as soon as it finishes installing the operating system. When you finish installing the operating system in your new virtual machine by any other means (rebooting the virtual machine when prompted), install VMware Tools.

Not all features are supported on all guests.

You can use the VMware Tools control panel to set various options that optimize your guest operating system for use in a virtual machine.

Installing or Upgrading VMware Tools

Installing VMware Tools is part of the process of creating a new virtual machine, and upgrading VMware Tools is part of the process of keeping your virtual machine up to current standards.

How you install or upgrade VMware Tools depends on the operating system and the source you use for the tools.

VMware upgrades VMware Tools frequently to support new devices and to add enhancements that improve the performance of your virtual machines. When you upgrade Fusion, you should also upgrade VMware Tools.

In Windows virtual machines, you can set VMware Tools to notify you when an upgrade is available. If this notification option is enabled, the VMware Tools icon in the Windows taskbar includes a yellow caution icon ( ) when a VMware Tools upgrade is available.

Manually Installing VMware Tools on a Windows Virtual Machine

Guest operating system Windows 2000 and earlier, Windows XP, Windows Server 2003, Windows Vista, and later support VMware Tools.

Prerequisites

- Power on the virtual machine.
- Verify that the guest operating system is running.

- If you connected the virtual machine's virtual CD/DVD drive to an ISO image file when you installed the operating system, change the setting so that the virtual CD/DVD drive is configured to autodetect a physical drive.

  The autodetect setting enables the virtual machine's first virtual CD/DVD drive to detect and connect to the VMware Tools ISO file for a VMware Tools installation. This ISO file is detected as a physical CD by your guest operating system. Use the virtual machine settings editor to set the CD/DVD drive to autodetect a physical drive.
- Log in as an administrator unless you are using an older Windows operating system. Any user can install VMware Tools in a Windows 95, Windows 98, or Windows ME guest operating system. For operating systems later than these, you must log in as an administrator.

Procedure

1. On the host, from the VMware Fusion menu bar, select **Virtual Machine > Install VMware Tools**.

   If an earlier version of VMware Tools is installed, the menu item is **Update VMware Tools**.
2. If you are installing VMware Tools for the first time, click **OK** on the Install VMware Tools information page.

   If autorun is enabled for the CD-ROM drive on the guest operating system, the VMware Tools installation wizard starts.

   If autorun is not enabled, to manually launch the wizard, click **Start > Run** and enter **`D:\setup.exe`**, where **`D:`** is your first virtual CD-ROM drive. Use **`D:\setup64.exe`** for 64-bit Windows guest operating system.
3. Follow the on-screen prompts.
4. If the New Hardware wizard appears, follow the prompts and accept the defaults.

   Note If you are installing a beta or RC version of VMware Tools and you see a warning that a package or driver is not signed, click **Install Anyway** to complete the installation.
5. When prompted, reboot the virtual machine.

What to do next

If a new virtual hardware version is available for the virtual machine, upgrade the virtual hardware.

Manually Installing VMware Tools on a Linux Virtual Machine

For Linux virtual machines, you manually install VMware Tools from the command line. For later Linux distributions, use the integrated open-vm-tools version.

Prerequisites

For more information on OS compatibility for open-vm-tools, see the *VMware Compatibility Guide* at https://www.vmware.com/resources/compatibility/search.php.

- Power on the virtual machine.

- Verify that the guest operating system is running.
- Because the VMware Tools installer is written in Perl, verify that Perl is installed in the guest operating system.

Procedure

1. On the host, from the VMware Fusion menu bar, select **Virtual Machine > Install VMware Tools**.

   If an earlier version of VMware Tools is installed, the menu item is **Update VMware Tools**.
2. In the virtual machine, open a terminal window.
3. Run the `mount` command with no arguments to determine whether your Linux distribution automatically mounted the VMware Tools virtual CD-ROM image.

   If the CD-ROM device is mounted, the CD-ROM device and its mount point are listed in a manner similar to the following output:

   ```
   /dev/cdrom on /mnt/cdrom type iso9660 (ro,nosuid,nodev)
   ```
4. If the VMware Tools virtual CD-ROM image is not mounted, mount the CD-ROM drive.
   a. If a mount point directory does not already exist, create it.

      ```
      mkdir /mnt/cdrom
      ```

      Some Linux distributions use different mount point names. For example, on some distributions the mount point is `/media/VMware Tools` rather than `/mnt/cdrom`. Modify the command to reflect the conventions that your distribution uses.
   b. Mount the CD-ROM drive.

      ```
      mount /dev/cdrom /mnt/cdrom
      ```

      Some Linux distributions use different device names or organize the `/dev` directory differently. If your CD-ROM drive is not `/dev/cdrom` or if the mount point for a CD-ROM is not `/mnt/cdrom`, modify the command to reflect the conventions that your distribution uses.
5. Change to a working directory, for example, `/tmp`.

   `cd /tmp`
6. (Optional) Delete any previous `vmware-tools-distrib` directory before you install VMware Tools.

   The location of this directory depends on where you placed it during the previous installation. Often this directory is placed in `/tmp/vmware-tools-distrib`.
7. List the contents of the mount point directory and note the file name of the VMware Tools tar installer.

   ```
   ls mount-point
   ```

8 Uncompress the installer.

```
tar zxpf /mnt/cdrom/VMwareTools-x.x.x-yyyy.tar.gz
```

The value *x.x.x* is the product version number, and *yyyy* is the build number of the product release.

9 If necessary, unmount the CD-ROM image.

```
umount /dev/cdrom
```

If your Linux distribution automatically mounted the CD-ROM, you do not need to unmount the image.

10 Run the installer and configure VMware Tools as a root user

```
cd vmware-tools-distrib
sudo ./vmware-install.pl
```

Usually, the `vmware-config-tools.pl` configuration file runs after the installer file finishes running. If you attempt to install a tar installation over an RPM installation, or the reverse, the installer detects the previous installation and must convert the installer database format before continuing.

Note For newer Linux distributions, users are prompted to choose the integrated open-vm-tools.

11 Follow the prompts to accept the default values, if appropriate for your configuration.

12 Follow the instructions at the end of the script.

Depending on the features you use, these instructions can include restarting the X session, restarting networking, logging in again, and starting the VMware User process. You can alternatively reboot the guest operating system to accomplish all these tasks.

What to do next

If a new virtual hardware version is available for the virtual machine, upgrade the virtual hardware.

Manually Installing VMware Tools in a macOS Virtual Machine

For macOS virtual machines you install or upgrade VMware Tools using an installer assistant.

Prerequisites

- Power on the virtual machine.
- Verify that the guest operating system is running.

Procedure

1 On the host, from the VMware Fusion menu bar, select **Virtual Machine > Install VMware Tools**.

If an earlier version of VMware Tools is installed, the menu item is **Update VMware Tools**.

2 Open **Install VMware Tools** on the VMware Tools virtual disc, follow the prompts in the installer assistant, and click **OK**.

The virtual machine restarts to have VMware Tools take effect.

Repair or Change Modules in Windows Virtual Machines

If you have problems with enhanced graphics display or mouse actions or with features that depend on VMware Tools, you might need to repair or modify installed modules.

Occasionally, some new modules are not installed during a VMware Tools upgrade. You can manually install new modules by modifying installed modules.

Important Do not use the guest operating system's **Add/Remove Programs** item in the Windows Control Panel to repair or modify VMware Tools.

Prerequisites

- Power on the virtual machine.
- Log in to the guest operating system.

Procedure

1. On the host, from the Workstation menu bar, select **VM > Install VMware Tools**.

   If an earlier version of VMware Tools is installed, the menu item is **Update VMware Tools**.
2. On the host, from the VMware Fusion menu bar, select **Virtual Machine > Install VMware Tools**.

   If an earlier version of VMware Tools is installed, the menu item is **Update VMware Tools**.
3. If autorun is not enabled for the CD-ROM drive, to manually launch the VMware Tools installation wizard, click **Start > Run** and enter `D:\setup.exe`, where `D:` is your first virtual CD-ROM drive.
4. On the Welcome page of the wizard, click **Next**.
5. Specify whether to repair or modify the modules.
   - Click **Repair** to repair the files, registry settings, and so on of components that are already installed.
   - Click **Modify** to select which modules are installed.
6. Follow the on-screen prompts.

What to do next

If features still do not work, uninstall and reinstall VMware Tools.

Uninstalling VMware Tools

If the upgrade process of VMware Tools is incomplete, you can uninstall and then reinstall the VMware Tools.

Prerequisites

- Power on the virtual machine.

- Log in to the guest operating system.

Procedure

- Select a method to uninstall VMware Tools.

Operating System	Action
Windows 7, 8, 8.1, or Windows 10	In the guest operating system, select **Programs > Uninstall a program**.
Windows Vista and Windows Server 2008	In the guest operating system, select **Programs and Features > Uninstall a program**.
Windows XP and earlier	In the guest operating system, select **Add/Remove Programs**.
Linux	Log in as root and enter **`vmware-uninstall-tools.pl`** in a terminal window.
Mac OS X, OS X, or macOS	Use the **Uninstall VMware Tools** application, found in `/Library/Application Support/VMware Tools`.

What to do next

Reinstall VMware Tools.

Cloning Virtual Machines with Fusion Pro

Installing a guest operating system and applications can be time consuming. With Fusion Pro, you can make many copies of a virtual machine from a single installation and configuration process.

Clones are useful when you must deploy many identical virtual machines to a group. For example, an MIS department can clone a virtual machine that has a suite of preconfigured office applications for each employee. You can also configure a virtual machine that has a complete development environment and clone it repeatedly as a baseline configuration for software testing.

The existing virtual machine is called the parent virtual machine. Two types of clones are available for creation: linked clones and full clones. Linked clones are created more quickly than full clones, but are dependent on the parent virtual machine. Full clones take longer to create, but are completely independent of the parent virtual machine.

Changes made to a clone do not affect the parent virtual machine, and changes made to the parent virtual machine do not appear in a clone. The MAC address for a clone is different from the parent virtual machine.

Using Linked Clones

A linked clone is a copy of a virtual machine that shares virtual disks with the parent virtual machine in an ongoing manner. You can create linked clones only by using Fusion Pro.

Because a linked clone is created from a snapshot of the parent, disk space is conserved and multiple virtual machines can use the same software installation. All files available on the parent at the moment you take the snapshot continue to remain available to the linked clone.

Ongoing changes to the virtual disk of the parent do not affect the linked clone, and changes to the disk of the linked clone do not affect the parent. A linked clone must have access to the parent. Without access to the parent, you cannot use a linked clone.

Because linked clones are created quickly, you can create a unique virtual machine for each task. You can also share a virtual machine with other users by storing the virtual machine on your local network where other users can quickly make a linked clone. For example, a support team can reproduce a bug in a virtual machine, and an engineer can quickly make a linked clone of that virtual machine to work on the bug.

You can make a linked clone from a linked clone, but the performance of the linked clone degrades. It is recommended that you make a new linked clone of the original parent virtual machine, when possible. If you make a full clone from a linked clone, the full clone is an independent virtual machine that does not require access to the linked clone or its parent.

Important You cannot delete a linked clone snapshot without destroying the linked clone. You can safely delete the snapshot only if you also delete the clone that depends on it. Also, moving the linked clone or the parent virtual machine breaks the connection between the linked clone and parent.

Since a linked clone has a dependency on the parent, you cannot delete a parent if it has a clone. You must first delete all linked clones and snapshots before you can delete the parent virtual machine.

Using Full Clones

A full clone is a complete and independent copy of a virtual machine. A full clone shares nothing with the parent virtual machine after the cloning operation. Ongoing operation of a full clone is separate from the parent virtual machine. You can create full clones only with Fusion Pro.

Because a full clone does not share virtual disks with the parent virtual machine, full clones generally perform better than linked clones. Full clones take longer to create than linked clones. Creating a full clone can take several minutes if the files involved are large.

Because a full clone duplicates only the state of the virtual machine at the instant of the cloning operation, it does not have access to snapshots of the parent virtual machine.

You can delete a full clone without affecting the parent virtual machine.

Clone a Virtual Machine

You can clone virtual machines only if you have Fusion Pro. You do not need to find and manually copy the parent virtual machine files.

Note

- You can access cloning options from the right-click menu, Virtual Machine menu and snapshot manager.
- You cannot create linked clones from encrypted virtual machines.
- You cannot create linked or full clones from restricted virtual machines.
- You cannot create linked or full clones from Boot Camp virtual machines.
- You can create full clones from encrypted virtual machines.
- You can create a cloned virtual machine from the powered off snapshot of the parent virtual machine.

Prerequisites

- Familiarize yourself with the types of clones. See Using Linked Clones and Using Full Clones.
- If making a linked or full clone from the current state of a virtual machine, power down the virtual machine.

Procedure

1. (Optional) To create a clone from the current state of a virtual machine:
   a. Select a virtual machine from the Virtual Machine Library.
   b. Click **Virtual Machine** and select either **Create Full Clone** or **Create Linked Clone**, depending on the type of clone you want to create.

      Fusion takes a snapshot of the selected virtual machine when creating a linked clone.
2. (Optional) To create a clone from a snapshot of a virtual machine:
   a. Select a virtual machine from the Virtual Machine Library.
   b. Click **Snapshots**.
   c. Select a snapshot and right-click. Select either **Create Full Clone** or **Create Linked Clone**, depending on the type of clone you want to create.
3. Type a name for the clone and click **Save**.

   A full clone can take several minutes to create, depending on the size of the virtual disk that is being duplicated.

The clone appears in the Virtual Machine Library.

A linked clone virtual machine is designated by a clone badge in the Virtual Machine Library. The parent virtual machine name is shown under the virtual machine name in the Virtual Machine Library display. In snapshot manager, a snapshot which has a linked clone virtual machine is designated with a snapshot badge.

What to do next

If the parent virtual machine uses a static IP address, change the static IP address of the clone before the clone connects to the network to prevent IP address conflicts.

Although the cloning process creates a new MAC address for the clone, other configuration information, such as the virtual machine name and static IP address configuration, is identical to that of the parent virtual machine.

Working with Your Virtual Machines

5

You can work with virtual machines in the same way that you can work with physical machines. Your Mac and virtual machines can also interact.

This chapter includes the following topics:

- Scan for Virtual Machines to Add to the Virtual Machine Library
- Running Fusion and Virtual Machines
- Open a Windows Application While You Are in Unity View
- Open a Windows Application from the Applications Menu
- Moving and Sharing Files with Your Mac
- Sharing Applications Between Your Mac and Your Windows Virtual Machines
- Keep a Windows Application in the Mac Dock
- Switch Between Virtual Machines That Are Powered On
- Using Mac Input Devices in a Virtual Machine
- Force Virtual Machines to Grab Keyboard and Mouse Input

Scan for Virtual Machines to Add to the Virtual Machine Library

You can quickly add multiple virtual machines to the Virtual Machine Library by initiating a scan.

You can manually add one or more virtual machines at a time to the Virtual Machine Library. For information about various actions you can perform in the Virtual Machine Library, see Perform Actions on Your Virtual Machines from the Virtual Machine Library Window. Alternatively, you can initiate a scan that automates the process of adding virtual machines to the library. Using a scan to search for virtual machines eliminates the need for you to search for or remember the location of each virtual machine.

Fusion scans the preselected folders and all subfolders within the preselected folders. In the context of a scan, files with the `.vmx` extension are considered virtual machines.

You can preselect which folders Fusion searches during a scan. When you initiate the scan, Fusion adds all the new virtual machines it finds in the preselected folders to the Virtual Machine Library.

Procedure

1 Select **File > Scan for Virtual Machines**.

2 Add and delete folders as necessary until the list of folders in the Scan for Virtual Machines dialog box meets your needs.

Option	Description
Add	a Click **+**. b Search as necessary and select a folder to add. c Click **Open**. The selected folder path is added to the Scan for Virtual Machines dialog box.
Delete	a Click a folder path in the Scan for Virtual Machines dialog box. b Click **-**. The selected folder path is deleted from the Scan for Virtual Machines dialog box.

3 Click **Scan**.

A message appears that reports the number of virtual machines found and added to the Virtual Machine Library.

4 To view the list of virtual machines in the Virtual Machine Library, select **Window > Virtual Machine Library**.

Running Fusion and Virtual Machines

You can start up, shut down, suspend, pause, resume, restart, and reset your virtual machines. You can send power commands to either the guest operating system or the virtual machine.

Open an Existing Virtual Machine

You can open an existing virtual machine from the **Virtual Machine Library** window or from the applications menu.

For information about using Fusion Pro to open a Horizon FLEX virtual machine, see the *VMware Horizon FLEX Client User Guide*.

Procedure

- Open a virtual machine from the Virtual Machine Library.
  a Select **Window > Virtual Machine Library**.
  b Select a virtual machine from the list of recognized virtual machines.
  c Click the run button.

- Open a virtual machine from the applications menu

  a Click the applications menu status item ( ) in the menu bar.

  The applications menu appears, displaying the most recently accessed virtual machine in the blue title bar.

  b Click the pop-up menu in the title bar and select the virtual machine.

  c Click **Resume** or **Start Up**.

Browse for a Virtual Machine

One way to open an existing virtual machine is to find and open its package file.

Procedure

1 Select **File > Open**.

2 In the file selection window, find and select the virtual machine package or configuration file for the virtual machine to open.

  Virtual machine package files have the extension `.vmwarevm`. Virtual machine configuration files have the extension `.vmx`. You can view a file's extension by selecting **File > Get info**.

3 Click the **Open** button.

Fusion opens the virtual machine and powers it on.

Open a Virtual Machine From the Finder

You can open an existing virtual machine from its package file.

Procedure

1 In the Finder, browse to the Virtual Machines folder (usually in your *user*`/Documents` folder) and find the package or configuration file for the virtual machine.

  Virtual machine package files have the extension `.vmwarevm`. Virtual machine configuration files have the extension `.vmx`.

2 (Optional) You can view a file's extension by selecting **File > Get info**.

3 Double-click the virtual machine package or configuration file to open the virtual machine in Fusion.

  If Fusion is not running, it starts automatically.

Start a Virtual Machine's Operating System

You can start a powered-off guest operating system in your virtual machine.

Certain actions, such as making changes to the virtual machine configuration, require having a virtual machine open without the operating system powered on. After the action is complete, you can start the operating system.

Procedure

- Start the virtual machine's operating system, depending on the state of the virtual machine and guest operating system.
  - If the virtual machine is not running, open the virtual machine from the Finder or Virtual Machine Library.

    Fusion starts the virtual machine's operating system when you open the virtual machine.
  - If the virtual machine is already open in Fusion, but the operating system is shut down, select **Virtual Machine > Start Up**.

Open a Virtual Machine Without Powering On

Some configuration tasks require that the virtual machine be powered off. In the Virtual Machine Library you can access a virtual machine without powering it on.

Procedure

1. In the **Virtual Machine Library** window, select the virtual machine to work on.
2. (Optional) If the virtual machine to configure is displayed as Suspended or Powered on, open the virtual machine and power it off.
   - Use the **Shut Down** button in the toolbar
   - Use the **Shut Down** command in the **Virtual Machine** menu.

   Fusion opens the virtual machine without powering it on or opening it in a window.
3. Click the **Settings** button.

You can make changes to the settings that require that the virtual machine be powered off.

Shut Down a Virtual Machine's Operating System

You can shut down the guest operating system in your virtual machine.

You can use several methods to shut down your virtual machine's operating system. This is the preferred method.

Procedure

- Select **Virtual Machine > Shut Down**.

Suspend and Resume a Virtual Machine in Fusion

The suspend and resume feature is useful to save the current state of a virtual machine and continue work later from the same state, even if you quit Fusion in the interim.

Fusion does not support suspending and resuming in Boot Camp virtual machines. Suspending and resuming rely on being able to save a known state that will not change. You can boot natively into Windows in the Boot Camp partition. When you do so, the known state is lost and data loss occurs.

Procedure

- Take one of the following actions.
  - Select **Virtual Machine > Suspend** to suspend your virtual machine.

    You can also set a Fusion preference to suspend the virtual machine when you close the virtual machine window.
  - Select **Virtual Machine > Resume** to resume your virtual machine.

Cancel a Resume Command

You can cancel a resume command while Fusion is restoring the virtual machine state.

When you resume a suspended virtual machine, Fusion displays two progress bars in order. The second bar has a cancel button.

Procedure

- Click the cancel button before the progress bar is 100 percent filled.

Power on a Virtual Machine to Firmware in Fusion Pro

In Fusion Pro, you can power on or restart a virtual machine to firmware.

The power on to firmware option is available for local and remote virtual machines. If the virtual machine is suspended, the power on to firmware option is not available

The power on to firmware option is supported in Fusion Pro 8.1 and later.

Procedure

- Click **Virtual Machine > Power on to firmware**.

  If the virtual machine is powered off, the virtual machine boots directly to firmware. If the virtual machine is powered on, you are prompted to restart your virtual machine. Click **Restart**.

Pause a Virtual Machine

Pausing a virtual machine stops the current state of a virtual machine. When you resume a paused virtual machine, the state of the virtual machine is exactly the same as when you paused it.

Note The current state of the virtual machine is not saved when you pause a virtual machine. If you quit Fusion while a virtual machine is paused, Fusion suspends or shuts down the virtual machine depending on your Fusion preferences.

Procedure

- Click **Virtual Machine > Pause**.

What to do next

Resume the virtual machine when you are ready to work with it again.

Restart a Virtual Machine

You can restart a virtual machine without restarting your Mac.

Procedure

- Restart the virtual machine operating system.
  - In the virtual machine, restart the operating system as you would in a physical computer.

    The restart method depends on the operating system running in the virtual machine.
  - In Fusion, select **Virtual Machine > Restart**.

Reset a Virtual Machine

You can select a Fusion command to reset a virtual machine, much as you would press the reset button on a physical computer when it becomes unresponsive.

Caution Resetting the virtual machine can cause data loss.

Procedure

- Press the **Option** key and click **Virtual Machine > Force Restart**, the hard power option, to reset the operating system in your virtual machine.

Uninstall a Virtual Machine by Using the Finder

You can uninstall a virtual machine by deleting its files.

One method for uninstalling a virtual machine is to use the Finder to delete the virtual machine package.

Prerequisites

Shut down or power off the virtual machine.

Exit Fusion.

Procedure

1. Browse to the Virtual Machines folder (usually in your *user*/Documents folder) and select the virtual machine to uninstall.
2. Move the virtual machine package file to the Trash.

What to do next

Open Fusion. If you see the uninstalled virtual machine in the Virtual Machine Library, right-click it and select **Delete**.

Uninstall a Virtual Machine by Using the Virtual Machine Library

You can uninstall a virtual machine by deleting its files.

One method for uninstalling a virtual machine is to use the Virtual Machine Library to delete the virtual machine files.

Prerequisites

Shut down or power off the virtual machine.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Click the thumbnail of the virtual machine to uninstall.
3. Select **Edit > Delete**.
4. In the Remove Virtual Machine dialog box, select a method of uninstalling the virtual machine.

   Depending on the type of virtual machine you are uninstalling, you might be presented with different options for deleting the virtual machine.

Option	Action
Move to Trash	Removes the virtual machine from the Virtual Machine Library window and moves all the virtual machine files to the Trash.
Keep File	Removes the virtual machine from the Virtual Machine Library window, but does nothing to the virtual machine files in the Virtual Machines folder.
Delete Permanently	Removes the virtual machine from the Virtual Machine Library window and deletes the virtual machine files permanently. The files are deleted permanently and not moved to the trash.

Send the Ctrl-Alt-Delete Command to a Virtual Machine

You can use a Fusion command to send the Ctrl-Alt-Delete keystroke combination to a Windows virtual machine.

Procedure

- You can send the keystroke combination in any of the following ways.
  - Select **Virtual Machine > Send Ctrl-Alt-Del**.
  - If you are using an external PC keyboard, press Ctrl+Alt+Del.
  - On a full-sized Mac keyboard, press Fwd Del+Ctrl+Option. The ⌦ Forward Delete key is below the Help key.
  - On a Mac laptop keyboard, press Fn+Ctrl+Option+Delete.

Send Special Key Commands to a Windows or Linux Virtual Machine

If your keyboard does not have the full range of keys that can be found on some keyboards, you can still send special key commands to the guest operating system.

Procedure

1 Select **Virtual Machine > Send Key**.

2 Select the key command from the pop-up menu. See Special Key Commands.

Fusion sends the key command to the guest operating system on the virtual machine.

Special Key Commands

You can use special key commands with a virtual machine.

The Send Key item on the **Virtual Machine** menu contains a number of key commands that might not be available on all keyboards.

Table 5-1. Special Key Commands

Key commands that can be sent to the virtual machine with the Send Key menu item
Help (Insert)
Home
End
⌦ (Forward Delete)
Caps Lock
Clear (Num Lock)
Scroll Lock
Print Scrn
Pause
Break
Menu
F8
F9
F10
F11
F12
F13
F14
F15
F16
変換 (Henkan)
無変換 (Muhenkan)
ひらがな (Hiragana)

Switch Power Commands from the Default Options

With a keyboard shortcut, you can switch some of the Fusion power command options that appear in the **Virtual Machine** menu and the applications menu, from the default option.

The shortcut applies to the **Shut Down**/**Power Off** and **Restart**/**Reset** power-option pairs as listed in the **Virtual Machine** menu and the applications menu ( ). Pressing the Option or Alt key does not affect the power buttons in the toolbar.

For example, if your virtual machine defaults to the soft options, **Shut Down** and **Restart**, holding down either the Option key or the Alt key changes the soft options to the hard options, **Power Off** and **Reset**, respectively.

Pressing the Option or Alt key has no effect on other power options.

Note You can also configure Fusion to permanently display the hard option or soft option of a power-option pair. Therefore, you can change **Shut Down** to **Power Off** and **Restart** to **Reset**. Later, when you access the **Virtual Machine** or application ( ) menu while the virtual machine is in a powered-on state, Fusion lists the **Power Off** option instead of **Shut Down** option and the **Reset** option instead of the **Restart** option. See Configure Virtual Machine Power Options.

Procedure

1 Select **Virtual Machine** to display the **Virtual Machine** menu.

2 Hold down the Option key (Mac keyboards) or Alt key (PC keyboards) and select an alternative power option.

Table 5-2. Power Commands

Soft Option	Hard Option
Shut Down	**Power Off**, also called Force Shut Down
Restart	**Reset**, also called as Force Restart

See Options for Fusion Power Commands for descriptions of the power commands.

Options for Fusion Power Commands

You can configure your virtual machine to have soft or hard power options.

The way the Fusion power commands work depends on the way your virtual machine is configured. If the virtual machine was created in Fusion, the power commands default to soft options. The commands take effect on the guest operating system. Virtual machines created in other VMware products might default to hard power options. These commands act on the virtual machine the way the power and reset buttons work on a physical computer's power supply.

Note You can change the default configuration of some of the power-option pairs from the hard option to the soft option or reverse after the virtual machine is created. For example, you can change **Shut Down**, which is a soft power option, to its hard-option counterpart, **Power Off**.

- To perform the switch with a keyboard shortcut, see Switch Power Commands from the Default Options.
- To configure Fusion to make the switch permanently, see Configure Virtual Machine Power Options.

Table 5-3. Soft and Hard Options for Power Commands in the Virtual Machine Menu

Command	Result
Start Up (soft option)	Triggers a `startup` script to run. You can customize this script. For more information, see the document *Installing and Configuring VMware Tools* at http://www.vmware.com/pdf/vmware-tools-installation-configuration.pdf.
Power On (hard option)	Starts the virtual machine.
Resume (soft option)	Triggers a `resume` script to run. You can customize this script. For more information, see the document *Installing and Configuring VMware Tools* at http://www.vmware.com/pdf/vmware-tools-installation-configuration.pdf.
Force Resume (hard option)	Resumes the virtual machine from a suspended state.
Shut Down (soft option)	Triggers a `poweroff` script to run. Sends a shut-down signal to the guest operating system. An operating system that recognizes this signal shuts down gracefully. Not all guest operating systems respond to a shut-down signal from this button. If your operating system does not respond, shut down from the operating system, as you would with a physical machine.
Power Off (hard option) Also called **Force Shut Down**	Works the way a power switch works on a computer's power supply. The virtual machine is abruptly powered off, with no consideration for work in progress. This action can result in data loss. When possible, shut down the virtual machine's operating system before you power off the virtual machine.
Suspend (soft option)	Triggers a `suspend` script to run. You can customize this script. For more information, see the document *Installing and Configuring VMware Tools* at http://www.vmware.com/pdf/vmware-tools-installation-configuration.pdf.
Force Suspend (hard option)	The **Force Suspend** command suspends the virtual machine.

Table 5-3. Soft and Hard Options for Power Commands in the Virtual Machine Menu (Continued)

Command	Result
Restart (soft option)	Sends a restart signal to the guest operating system. An operating system that recognizes this signal shuts down gracefully and restarts. Not all guest operating systems respond to a restart signal from this button. If your operating system does not respond, restart from the operating system, as you would with a physical machine.
Reset (hard option) Also called **Force Restart**	Works as a reset switch. The virtual machine is abruptly reset, with no consideration for work in progress. When possible, restart the virtual machine's operating system. Use the reset option only as a last resort when the virtual machine's operating system is unresponsive.

Open a Windows Application While You Are in Unity View

When a virtual machine is running in Unity view, you do not see the guest operating system's desktop, but you can open an application without it.

When you are working with applications in an operating system, you can use several methods to start an application. In some cases, you click an icon on the desktop or use a start menu or its equivalent. When you use Unity view with a virtual machine, you cannot use those methods because only the active application windows appear on your Mac's desktop.

Prerequisites

With the virtual machine open in single window or full screen view, switch to Unity view. For example, select **View > Unity**.

When you switch to Unity view, the following events occur.

- The virtual machine interface disappears.
- Applications currently open in the virtual machine appear directly on the Mac desktop.
- VMware Unity ( ) appears in the Mac Dock.

Procedure

- Select the application from the applications menu.

  a Click VMware Unity ( ) in the Mac Dock.

  The VMware Unity applications menu appears in the Mac menu bar and a window opens that contains the applications menu.

  b Click the application icon in the list, or find it by clicking **All Programs**.

- Keep a virtual machine application in the Mac Dock.
  a With the application open, switch to Unity view by selecting **View > Unity**.

    The application appears in the Mac Dock.

  b Control-click or right-click the application in the Mac Dock and select **Options > Keep in Dock**.

    The application remains in the Mac Dock, where you can open it even if Fusion is not currently running.
- Show the Windows taskbar to use the start menu.
  a Select **View > Show Taskbar in Unity**.

    You might have to move the location of the Mac Dock to see the taskbar.

  b Click the **Start** menu and select the application.

Open a Windows Application from the Applications Menu

The applications menu is accessible after you click the VMware Unity icon ( ) in the Mac Dock.

Procedure

- Click the VMware Unity icon ( ) in the Mac Dock. See Find a Guest Application by Using the Applications Menu.
- Use the applications menu to search for the application.

Moving and Sharing Files with Your Mac

With Fusion, you can move and share files between a virtual machine and your Mac.

Moving and Copying Files and Text Between Virtual Machines and Your Mac

You can drag files and folders to move and copy them between your virtual machines and your Mac. You can move text by copying and pasting or cutting and pasting.

You can also drag images between Windows applications and Mac applications. You can drag Outlook attachments from a Windows virtual machine to your Mac. You can drag files in a virtual machine directly onto Mac applications. You can also drag and drop text, files or folders between a macOS virtual machine and your Mac.

You can copy and paste images and formatted text between a Windows or Linux virtual machine and your Mac. You can copy and paste text between a macOS virtual machine and your Mac. Copying and pasting files or folders between a macOS virtual machine and your Mac is not supported.

These features require VMware Tools.

Drag Files and Folders Between Virtual Machines and Your Mac

You can use your mouse to drag files and folders in either direction.

Procedure

- In either the virtual machine or your Mac, with the pointer over the icon of the file or folder to move, hold down the primary mouse button and drag the file or folder to the new location.

Fusion copies the file or folder to the new location.

Copy and Paste Between Virtual Machines and Your Mac Using the Menu

You can copy and paste between a virtual machine and your Mac.

Copy and paste works with images and text for Windows and Linux virtual machines and your Mac.

Procedure

1. In either the virtual machine or your Mac, select the text.
2. From the **Edit** menu, select **Copy** to copy the text, or **Cut** to move the text.
3. Move the pointer to the new location.
4. From the **Edit** menu, select **Paste** to copy or move the text to the new location.

Copy and Paste Between Virtual Machines and Your Mac Using Keyboard Shortcuts

You can copy and paste between a virtual machine and your Mac.

You can copy and paste images and formatted text between a Windows or Linux virtual machine and your Mac. You can copy and paste text between a macOS virtual machine and your Mac. Copying and pasting files or folders between a macOS virtual machine and your Mac is not supported.

Prerequisites

To use these shortcuts, make sure the Fusion preference **Enable Key Mappings** preference is selected.

Procedure

1. In either the virtual machine or your Mac, select the text.
2. Use the Mac keyboard shortcut ⌘**+C** to copy the text, or ⌘**+X** to move the text.
3. Move the pointer to the new location.
4. Use the Mac keyboard shortcut ⌘**+V** to copy or move the text to the new location.

View Shared Folders in a Windows Guest by Using Windows Explorer

You can use Windows Explorer to view shared folders between your Mac and Windows.

Procedure

1 Open Windows Explorer.

2 View shared folders using one of the following methods:

- Click on the **VMware Shared Folders** shortcut.
- In the Address bar, type **\\vmware-host\Shared Folders**.
- In the Address bar, type **Z:**.

  When the **Enable Shared Folders** setting is enabled, Fusion creates a network drive that maps the `\\vmware-host\Shared Folders` directory to the Z drive.

The Windows Explorer window displays your shared folders.

View Shared Folders in a Windows Guest by Mapping Them as a Drive

You can view your shared folders between your Mac and Windows by mapping them as a drive in Windows.

Procedure

1 Start Windows Explorer.

2 Navigate to **My Computer** or **Computer**.

3 Run the command to map a network drive.

Option	Description
Windows Vista, Windows 7, Windows 8, Windows 10	Click **Map Network Drive**
Windows operating systems other than Vista, Windows 7, Windows 8, Windows 10	Click **Tools > Map Network Drive**

4 Select a drive to map.

5 In the **Folder** field, type **\\vmware-host\Shared Folders**.

6 Click **Finish**.

Your shared folders appear in Windows Explorer on the drive that you mapped.

View Shared Folders in a Linux Guest

You can go to specific directories to find your shared folders.

Procedure

- Open the `/mnt/hgfs` directory in File Explorer to view shared folders on a Linux guest.

View Shared Folders in a macOS Guest

You can view folders that are shared between the macOS guest and the Mac host.

Procedure

1. Open the macOS guest.
2. Click the **VMware Shared Folders** shortcut on the guest OS desktop.

   The guest OS desktop displays your shared folders.

Sharing Applications Between Your Mac and Your Windows Virtual Machines

In the Applications panel of the virtual machine **Settings** window, you can set up Fusion so that your Mac can open applications in a virtual machine or so that a virtual machine can open applications on your Mac, or both.

Open a File in a Virtual Machine with an Application on Your Mac

When you select a file in your virtual machine, you can open it with the appropriate application on your Mac.

Prerequisites

Verify that the following conditions are met:

- You turned on **Shared Folders** in the Sharing panel of the virtual machine **Settings** window.
- You enabled **Open your Windows files and web links using Mac applications** in the Default Applications panel of the **Settings** window.
- You selected a folder or folders to share.
- The file to open is located in one of the shared folders.

Procedure

- To open a file one time, right-click the file, select **Open With** and select **Default Host Application**.

  Fusion determines the appropriate application on the Mac and uses that application to open the file.
- To always open a particular file with the Mac application, right-click the file, select **Properties**, click **Change** for **Opens With**, and select **Default Host Application** in the Open With dialog box.

  Whenever you open this file, it opens in the Mac application.
- To always open files of this type with the Mac application, right-click the file, select **Open With**, select **Default Host Application > Choose Program**, and select **Always use the selected program to open this kind of file**.

  Fusion determines the appropriate application on the Mac and uses that application whenever you open any file of this type.

Open a File on Your Mac with an Application in a Virtual Machine

You can open a file on your Mac with the appropriate application in one of your virtual machines.

For Windows virtual machines, you can open the Mac file with a virtual machine application as a one-time event, or you can set the application to be used whenever you open the file.

Prerequisites

Verify that the following conditions are met:

- You turned on **Shared Folders** in the Sharing panel of the virtual machine Settings window.
- You selected a folder or folders to share.
- The file to open is located in one of the shared folders.
- You enabled **Shared Folders** in the Default Applications panel of the **Settings** window.

Procedure

- For a one-time event, right-click the file, select **Open With**, and select an application from the menu.

  Because you can find the same application across many virtual machines, the menu entry shows the name of the virtual machine and the application name.

  The file opens in the application that appears in the menu.
- To always open with the virtual machine application, right-click the file, select **Get Info** and select an application from the **Open with** pop-up menu.
- (Optional) Click **Change All** to use the application to open all files of this type.

Whenever you open this file, it launches in the application that you selected.

Keep a Windows Application in the Mac Dock

You can place an icon tile for a Windows application in your Mac Dock. You can open the application in the same way that you open your Mac applications. You can access your virtual machine's applications without having to use the VMware Fusion menu bar or the guest operating system interface.

Procedure

1. With the application open, switch to Unity view by selecting **View > Unity**.

   The application appears in the Mac Dock.
2. Control-click or right-click the application in the Mac Dock and select **Options > Keep in Dock**.

Switch Between Virtual Machines That Are Powered On

You can operate multiple virtual machines at the same time, and can switch between them easily.

Procedure

- Select the virtual machine to work with from the **Window** menu within Fusion.

Using Mac Input Devices in a Virtual Machine

To use Mac keyboards, mice, and trackpads in a virtual machine, you sometimes must change settings and use key combinations as equivalents to PC commands.

Enable the Secondary Button in an Apple Mighty Mouse

In a virtual machine, the Apple Mighty Mouse does not perform a right-click when you Control-click. You must enable the secondary button to perform a right-click in a virtual machine.

Procedure

1. Select **VMware Fusion > Preferences** and click **Keyboard & Mouse**.
2. Select the **Secondary Button** check box.
3. (Optional) To change the shortcut for the secondary button, double-click the current shortcut, select a new shortcut, and click **OK**.

Using Mac Keyboards in a Virtual Machine

Because PC and Mac keyboards differ, you must press certain key combinations to enable certain PC commands on a Mac keyboard.

For keys with no keyboard equivalent, Fusion provides the **Send Key** item in the **Virtual Machine** menu.

For keys with no keyboard equivalent, Fusion provides the **Send Key** item in the **Virtual Machine** menu.

Table 5-4. PC and Mac Keyboard Equivalents

PC Keyboard	Apple External Keyboard	MacBook and MacBook Pro Built-In Keyboard
F1-F12	F1-F12	fn+F1 . . . fn+F12
Print Screen	F14	(use **Send Key**)
Scroll Lock	F15	(use **Send Key**)
Pause/Break	F16	(use **Send Key**)
Backspace	delete	delete
delete ⌦ (Forward Delete)	delete ⌦	fn+delete
Insert (toggles overwrite)	help (early models)	(use **Send Key** and select **Help** item)
Num Lock	clear	fn+num lock F6

Table 5-4. PC and Mac Keyboard Equivalents (Continued)

PC Keyboard	Apple External Keyboard	MacBook and MacBook Pro Built-In Keyboard
Command (Windows logo key—between Ctrl and Alt keys)	⌘	⌘
Alt	alt option	alt option

Force Virtual Machines to Grab Keyboard and Mouse Input

You can set the virtual machine to grab mouse and keyboard input. When input is grabbed, the mouse pointer is confined to the virtual machine window, and all keyboard and mouse input is directed to the virtual machine.

Ordinarily, with VMware Tools installed, when you click in the virtual machine, Fusion directs keyboard and mouse input to the virtual machine. When you click on your Mac desktop, keyboard and mouse input is directed to your Mac host. You can force all input to the virtual machine.

Procedure

- Force grab or force release keyboard and mouse input.

Option	Action
Force a virtual machine to grab keyboard and mouse input	On the keyboard, press Cmd+G.
Force a virtual machine to release keyboard and mouse input	On the keyboard, press Ctrl+⌘.

Sharing Files Between Windows and Your Mac

6

You can set up shared folders in guest operating systems to share files between your Mac and your Windows and other virtual machines.

In the Sharing panel of a virtual machine's **Settings** window, you can select shared folders on your Mac to make available to the virtual machine. This feature requires VMware Tools.

You can mirror folders in your Windows virtual machine and in your Mac. Mirrored folders match key folders in the virtual machine with their corresponding Mac folders: Desktop, Documents, Downloads, Movies, Music, and Pictures.

To use shared folders, you must configure your virtual machine settings to enable shared folders and to specify which directories on your Mac are to be shared. The shared folders can be in your Mac file system or they can be network directories accessible from your Mac.

The guest operating system determines how shared folders appear. You can view shared folders in certain Windows and Linux guest operating systems. For a list, see Guest Operating Systems That Support Shared Folders. Before you can view shared folders, you must enable and configure the shared folders function.

Note Do not open a file in a shared folder from more than one application at a time. For example, do not use an application on the Mac's operating system and another application in the virtual machine's operating system to open the same file at the same time. If one of the applications writes to the file, data might be corrupted.

This chapter includes the following topics:

- Guest Operating Systems That Support Shared Folders
- Guest Operating Systems That Support Mirrored Folders
- Enable Shared Folders or Mirrored Folders for a Virtual Machine
- Add or Remove a Mirrored Folder
- Add a Shared Folder
- Remove a Shared Folder

Guest Operating Systems That Support Shared Folders

You can use shared folders with virtual machines that are running certain operating systems.

Fusion supports shared folders in certain Windows, Mac, and Linux operating systems.

- Windows 10
- Windows 8.1
- Windows 8
- Windows 7
- Windows Server 2016
- Windows Server 2012
- Windows Server 2008
- Windows Server 2003
- Windows Vista
- Windows XP
- macOS 10.12 and 10.13
- Mac OS X 10.6, 10.7, 10.8, 10.9, 10.10 and 10.11
- Supported Linux guest operating systems with a kernel version of 2.4 or later

Guest Operating Systems That Support Mirrored Folders

You can use mirrored folders with virtual machines that are running a variety of Windows operating systems.

Fusion supports mirrored folders in these Windows operating systems.

- Windows 10
- Windows 8
- Windows 7
- Windows Vista
- Windows XP

Fusion does not support mirrored folders for Windows 2000 and earlier, or for Windows Server 2003 and Windows Server 2008. For virtual machines with unsupported guest operating systems, the choices are disabled in the Sharing panel of the **Settings** window.

Enable Shared Folders or Mirrored Folders for a Virtual Machine

Before you can identify which folders to share or mirror, you must configure your virtual machine to share folders.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under Systems Settings in the **Settings** window, click **Sharing**.
4. Select the **Enable Shared Folders** check box.

   This action enables shared folders. It also enables mirrored folders for supported Windows guest operating systems. On Windows and macOS virtual machines, a **VMware Shared Folders** shortcut is created on the guest operating system. Click on the shortcut to view the shared folders.

Add or Remove a Mirrored Folder

With Fusion mirrored folders you can map special folders on your Mac, such as Desktop, Documents, Downloads, Movies, Music, and Pictures, to their counterparts in certain Windows virtual machines.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under System Settings in the **Settings** window, click **Sharing**.
4. Select the **Enable Shared Folders** check box.
5. In the Mirrored Folders section, select the Mac folders to mirror and deselect any folders that you do not want mirrored.

Add a Shared Folder

You can share files between virtual machines and your Mac by using shared folders.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under Systems Settings in the **Settings** window, click **Sharing**.
4. Select the **Enable Shared Folders** check box.

   On Windows and macOS virtual machines, a **VMware Shared Folders** shortcut is created on the guest operating system.
5. Click the add (**+**) button at the bottom of the display box.
6. In the Finder sheet, find the location of the folder to share, select it, and click **Add**.

7 In the Permissions field, set the virtual machine permission on the contents of the Mac's shared folder.

Option	Description
Read & Write	Enables the virtual machine to change the contents of the shared folder on your Mac.
Read Only	Prevents the virtual machine from changing the contents of the shared folder on your Mac.

Permission settings on your Mac also determine access to files in the shared folder. Read-only permission on a file or folder takes precedence over the Shared Folder permission setting.

8 (Optional) Click the **Open in Guest** button to open the shared folder in the virtual machine.

This option is available only for Windows virtual machines that are powered on. The **Open in Guest** option was added in Fusion 8.1.

Remove a Shared Folder

You can remove a folder from the list of shared folders to stop sharing it.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under Systems Settings in the **Settings** window, click **Sharing**.

4 In the display box at the top of the Sharing panel, select the folder to remove.

5 Click the remove (**-**) button at the bottom of the display box.

Protecting Your Virtual Machines

7

You can protect your virtual machines from data loss and other problems by using snapshots, AutoProtect, complimentary anti-virus software, and backup applications.

This chapter includes the following topics:

- Snapshots
- AutoProtect
- Copy a Virtual Machine to External Media
- Using Time Machine When You Have Fusion on Your Mac

Snapshots

Taking a snapshot in Fusion lets you preserve the state of the virtual machine so that you can return to that state.

You might take a snapshot any time you are about to take an action in your virtual machine and you are unsure of the consequences. For example, you might take a snapshot before you make a change to your virtual machine's system software, such as an operating system upgrade or a major configuration change. If something doesn't work as expected after the change, you can restore the snapshot to return the virtual machine to its previous state.

You might also take a snapshot before you go on to the Internet, or log in to an unknown network. If your computer acquires a software virus or spyware, you can restore the snapshot to return the virtual machine to its previous uninfected state.

A snapshot captures the entire state of the virtual machine at the time you take the snapshot.

- Memory state – Contents of the virtual machine memory
- Settings state – Virtual machine settings
- Disk state – State of all the virtual disks

A snapshot is not the same as a backup. It is not a copy of your virtual machine.

View Snapshots for a Virtual Machine

The **Snapshots** window shows all of the snapshots for a virtual machine.

The **Snapshots** window shows manual snapshots and AutoProtect snapshots.

Procedure

1. Select the virtual machine to view snapshots for in one of the following ways.
   - Select the virtual machine from the Virtual Machine Library.
   - Open the virtual machine.
2. Open the **Snapshots** window for the selected virtual machine in one of the following ways.
   - Select **Virtual Machine > Snapshots**.
   - Click the **Snapshots** button in the virtual machine toolbar.

Take a Snapshot

Take a snapshot of the virtual machine's current state from the Snapshots window for that virtual machine.

The virtual machine does not need to be powered on for you to take a snapshot.

You cannot take a snapshot of a Boot Camp virtual machine. Snapshots rely on being able to save a known state that will not change. This is not possible with Boot Camp, in which you can boot natively into Windows in the Boot Camp partition. Once that happens, the known state would be lost and data loss would occur.

Procedure

1. In the **Snapshots** window of the virtual machine, select the **Current State** if it is not selected.
2. Click **Take**.
3. Name the new snapshot and give it a description in the dialog.
4. Click **Take**.

   Fusion takes the snapshot of the current state of the virtual machine.
5. Close the **Snapshots** window.

Restore a Virtual Machine to the State in a Snapshot

You can restore a virtual machine to an earlier state.

Procedure

1. Select **Virtual Machine > Snapshots**.
2. Select the snapshot to restore.
3. Click **Restore**.
4. Click either **Save** to save a snapshot of the current state before you restore the virtual machine to the selected snapshot state, or **Don't Save** a snapshot.

The virtual machine is restored to the state that the selected snapshot captured.

Delete a Snapshot

You can manually delete snapshots that you no longer need or to make more disk space available.

The virtual disk files that a snapshot creates do not contain the entire contents of the virtual machine's virtual disk. When you delete a snapshot, you must consolidate the changes that it captured into the original, parent virtual disk.

You cannot delete the snapshot showing the "Current State" of the virtual machine.

Prerequisites

Allocate enough time for virtual disk consolidation. If a snapshot captured a state considerably different from the earlier state, for example, a service pack upgrade, the consolidation might take up to a few hours.

Procedure

1. Select **Virtual Machine > Snapshots**.
2. Select the snapshot to delete.

Option	Action
To select multiple adjacent snapshots.	Shift-click
To select multiple snapshots that are not adjacent.	Command-click

3. Click **Delete**.
4. Click **Delete** to confirm that you want to delete the snapshot.

The snapshot is deleted and virtual disk consolidation takes place.

AutoProtect

Fusion can take snapshots of the state of your virtual machine at intervals with the AutoProtect function. This feature is in addition to manual snapshots, which you can take at any time.

Use AutoProtect to instruct Fusion to take a snapshot automatically every 30 minutes, every hour, or every day.

Set Up Automatic Snapshots with AutoProtect

Fusion can take snapshots of the state of a virtual machine automatically at set intervals, with the AutoProtect function. This function is in addition to manual snapshots, which you can take at any time.

When you turn on AutoProtect, you set the maximum number of AutoProtect snapshots to keep at a time. After this number is reached, Fusion deletes the oldest AutoProtect snapshot in the range to make room for the newest snapshot.

This number setting can affect the number of manual snapshots that you can take and keep. You can have no more than 100 snapshots for a virtual machine, and depending on the types and sizes of the virtual disk files, this number can be less. If the total of AutoProtect snapshots reach the limit, you cannot take manual snapshots.

Fusion uses this setting to estimate the minimum amount of hard disk space the AutoProtect snapshots will use. That information appears at the bottom of the panel. The maximum amount of hard disk space can be significantly more than the estimate, depending on the amount of changes you make between snapshots.

Note When you have manual or AutoProtect snapshots of a virtual machine, you cannot add or modify its virtual hard disk.

Procedure

1. Open a virtual machine, or select it in the Virtual Machine Library.
2. Select **Virtual Machine > Snapshots**.
3. Click **AutoProtect Settings**.
4. Select the **Enable AutoProtect** check box.
5. Select the frequency of snapshots.
6. Select the number of AutoProtect snapshots to retain.

   After this number is reached, Fusion deletes the oldest AutoProtect snapshot in the range to make room for the newest snapshot.
7. Click **Done** to apply the AutoProtect settings.
8. Close the Snapshots view and return to the virtual machine.

Prevent the Deletion of an AutoProtect Snapshot

When AutoProtect takes a new snapshot, it deletes the oldest snapshot to maintain the allowable number that you set. You can prevent the deletion of an AutoProtect snapshot.

Procedure

1. In the **Snapshots** window, hover the cursor over the AutoProtect snapshot to keep, and click the information button (i).
2. Click **Keep Snapshot**.

Fusion considers the AutoProtect snapshot the same as a snapshot taken manually. AutoProtect will not delete this snapshot when the next AutoProtect snapshot is taken.

Copy a Virtual Machine to External Media

Because virtual machines are files, you can back them up by making a copy.

Although virtual machines run other programs and manipulate files, they are still files themselves. Because of this, you can back them up by making a copy to external media and restore the virtual machines by copying back.

Note You cannot copy a Boot Camp virtual machine, because instead of having a virtual hard disk, the Fusion virtual machine uses the Boot Camp partition.

Prerequisites

Shut down or power off the virtual machine and shut down Fusion.

Procedure

1. Connect to the media to which you will be copying the virtual machine.
2. Browse to the Virtual Machines folder (usually in your *user*/Documents folder) and select the virtual machine to copy.
3. Right-click and select **Copy "*virtual machine name*"**.
4. Open the external media in the Finder, right-click and select **Paste Item**.

The contents of the virtual machine package is copied to the external media. You can reverse the process to restore the copied virtual machine to your Mac.

Using Time Machine When You Have Fusion on Your Mac

If you use Time Machine, exclude virtual machines from the backup.

Any change to a virtual machine's virtual hard disk file results in the entire file being backed up. When you have a 40GB virtual machine, having Time Machine back it up every hour can fill a hard disk quickly.

- Exclude a Virtual Machine From Time Machine

  To prevent problems with your virtual machines and to save space on your backup media, you should not back up virtual machines with Time Machine.

- Use Shared and Mirrored Folders If You Back Up Your Mac With Time Machine

  To use Time Machine to back up data and documents from your virtual machines, keep those files on the Mac.

Exclude a Virtual Machine From Time Machine

To prevent problems with your virtual machines and to save space on your backup media, you should not back up virtual machines with Time Machine.

If you do not exclude virtual machines from Time Machine backups, Time Machine can back up a virtual machine while it is running. Restoring from this kind of backup would overwrite your current virtual machines with versions that are incomplete and potentially damaged. For the recommended method of backing up virtual machines, see Copy a Virtual Machine to External Media.

Procedure

1. Open the Mac's System Preferences and click **Time Machine**.
2. Click **Options**.
3. Click the add (**+**) button at the bottom of the **Do not back up** list.
4. Browse to your `Documents` folder on the Mac, select the `Virtual Machines` folder, and click **Exclude**.

   The Virtual Machine folder appears in the **Do not back up** list, and displays the total memory used by all your virtual machines.
5. Click **Done**, and close the **Time Machine** window.

Use Shared and Mirrored Folders If You Back Up Your Mac With Time Machine

To use Time Machine to back up data and documents from your virtual machines, keep those files on the Mac.

When you use Shared Folders and Mirrored Folders in your virtual machines, you save your documents and data as files on the host, not in the guests. This means that although you exclude virtual machines from Time Machine backups, Time Machine can back up the files in the Shared and Mirrored folders because they do not reside in the virtual machines. See Enable Shared Folders or Mirrored Folders for a Virtual Machine

Prerequisites

Exclude your virtual machines from Time Machine.

Procedure

- Enable Shared or Mirrored folders.

Configuring Your Virtual Machines

8

You can configure the way your virtual machine uses the Mac system hardware and attached devices. You can manage your virtual hard disks.

This chapter includes the following topics:

- Fusion General System Settings
- Set a Virtual Machine to Start When Fusion Starts
- Setting Virtual Processors and Memory
- Enable Default Applications
- Configuring Keyboard and Mouse Profiles
- Enable a CD/DVD Drive on a Remote Virtual Machine
- Enable a Floppy Drive on a Remote Virtual Machine
- View the Status of a Server or Remote Virtual Machine
- Configuring Display Resolution Settings
- Enable Hot Keys for Virtual Machines
- Configure Discrete Graphics Management
- Set the Default Printer for a Virtual Machine
- Add a Device
- Select a Startup Device
- Encrypting and Restricting a Virtual Machine
- Virtual Machine Compatibility
- Configuring Guest Isolation Options for a Virtual Machine
- Managing Advanced Settings

Fusion General System Settings

You can find basic information about your virtual machine in the General system settings.

The General system settings of the virtual machine include the virtual machine name, the guest operating system, and notes. You can change some of the settings directly in this panel.

Table 8-1. General System Settings

Setting	Description
Name	Name of the virtual machine that you specified when you created it. This name appears in the Virtual Machine Library. You can change the name of the virtual machine at any time.
OS	Guest operating system installed in the virtual machine. This name is typically provided as the guest operating system you selected when you created the virtual machine. If you uninstall the guest operating system and install a different one, you can change the guest operating system listed here.
Notes	You can add notes about this virtual machine, its use, or other information at any time.
Start automatically when Fusion launches	Starts the virtual machine when you start Fusion.

Note Restricted virtual machines only show a subset of the full settings.

The General system settings include information about the virtual machine's hard disk and options for disk clean up.

You can use the **Clean up Virtual Machine** or **Clean up disks after shutting down virtual machine** options to free up space on your Mac. For more information, see Clean up a Virtual Machine.

Set a Virtual Machine to Start When Fusion Starts

You can set any virtual machine to start when you start Fusion.

You can set any number of virtual machines to start when you start Fusion. You must select this option in each virtual machine that you want to start when Fusion launches.

Setting a virtual machine to start when Fusion starts can be useful if you have many virtual machines that you want to start. You might want to start a virtual machine when Fusion starts if you use a laptop to run one virtual machine that you always want to resume every time you start Fusion.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under System Settings in the **Settings** window, select **General**.
4. Select the **Start automatically when VMware Fusion launches** check box.

The virtual machine starts each time you start Fusion.

Setting Virtual Processors and Memory

You can configure processor settings for a virtual machine, including the number of processors, the amount of virtual memory available, and whether to enable hypervisor applications, code profiling applications, and IOMMU.

Set the Number of Virtual Processors

You can increase performance of a virtual machine by making more processors available because more tasks can be performed simultaneously. When you assign a virtual processor to the virtual machine, it reduces the processor resources that are available to your Mac.

For Windows virtual machines running mostly office and Internet productivity applications, using multiple virtual processors is not beneficial, so the default single virtual processor is ideal. For server workloads and compute-intensive applications, adding extra virtual processors may provide an increase in application performance.

Application	Recommended number of processors
Desktop applications	1 processor
Server operating systems	2 processors
Video encoding, modeling, and scientific	4 processors

In some circumstances, adding additional processors can decrease the overall performance of the virtual machine and your Mac. This can occur if the operating system or application is not using the processors efficiently. In this case, reducing the number of processors is recommended.

Assigning all processors on the Mac to the virtual machine results in extremely poor performance. macOS must continue to perform background tasks even if no Mac applications are running. If you assign all processors to a virtual machine, this prevents important Mac tasks from being completed.

Prerequisites

Shut down or power off the virtual machine. You cannot change the setting while the virtual machine is powered on or suspended.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under System Settings in the **Settings** window, click **Processors & Memory**.
4. Select the number of processor cores for the virtual machine.

   Information about your selected number of processors is displayed at the bottom of the **Processors & Memory** window.
5. Restart the virtual machine.

Set the Amount of Virtual Memory

Certain applications in the virtual machines might perform better with more memory available. Having more memory available to the guest operating system can facilitate caching, which can improve performance of the virtual machine. You can change the amount of virtual memory available to a virtual machine.

For the best balance of performance between Windows and Mac applications, do not give Windows too much memory, because it might cause your Mac to become slower. For Windows XP, 512MB of memory is ideal for Internet and office productivity applications.

For Windows Vista, Windows 7, Windows 8 and Windows 10, 1GB of memory is ideal for Internet and office productivity applications. 1GB of memory is appropriate for both the 32-bit and 64-bit versions of Windows 7, Windows 8 and Windows 10. If your Mac has at least 6GB of memory, Fusion uses 2GB of memory as the default for 64-bit versions of Windows 7, Windows 8 or Windows 10 guests. These settings are the default memory settings for Windows virtual machines that Fusion Easy Install creates.

Note Manufacturer recommendations do not generally take virtualization into account in terms of performance. Good performance relies on balancing the needs of the Mac with the needs of the virtual machine.

Prerequisites

Shut down or power off the virtual machine. You cannot change the setting while the virtual machine is powered on or suspended.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under System Settings in the **Settings** window, click **Processors & Memory**.
4. Set the amount of memory to allocate to the virtual machine by using the slider control.

   The memory slider control displays the recommended amount of memory for your virtual machine.

Set Advanced Processor Options

You can enable hypervisor applications, applications that use performance counters, or both in certain virtual machines.

With Fusion virtual machines, you have the following advanced options:

- You can run hypervisor applications such as Workstation Pro and Fusion inside a virtual machine. For example, you can use Fusion to create a virtual machine, install Workstation Pro in that virtual machine, and then use that version of Workstation Pro to create a virtual machine.
- You can use code profiling applications such as VTune or OProfile to optimize or debug software that runs inside a virtual machine.

- You can use input–output memory management unit (IOMMU), which is capable of mapping virtual addresses to physical addresses.

Important If you enable either of the preceding settings and then move the virtual machine to another host system, confirm that the new host uses the same kind of CPU.

The **Enable hypervisor applications in this virtual machine** and **Enable IOMMU in this virtual machine** settings are required to enable virtualization-based security (VBS), a feature that reinforces the security of Microsoft Hyper-V. See Enable Microsoft Virtualization-Based Security. When you enable VBS, these two settings are automatically selected and are disabled for editing. They become editable when you disable VBS.

Prerequisites

- Verify that the virtual machine is compatible with Fusion 8 or later virtual machines.
- Verify that the virtual machine does not have an older guest operating system, such as Windows versions prior to Windows XP.
- Verify that the host system has a CPU that is recent enough to support Virtualized Intel VT-x/EPT, performance counters, and IOMMU.
- Shut down or power off the virtual machine. You cannot change the setting while the virtual machine is powered on or suspended.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under System Settings in the **Settings** window, click **Processors & Memory**.
4. Click to expand **Advanced Options** and select the check boxes for the options that you want to use.

Enable Default Applications

You can set up Fusion so that certain applications open files regardless of whether the files reside on your Mac or in the virtual machine.

The Default Applications setting also adds applications from your virtual machine to your Mac **Applications** menu and Spotlight.

Prerequisites

- Verify that VMware Tools is installed.
- If your virtual machine is suspended, power it on.

Procedure

- Select **Window > Virtual Machine Library**.
- Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

- Under System Settings in the **Settings** window, click **Default Applications**.
- Select the defaults for application sharing between your Mac and the virtual machine.

  You can enable more than one of these options at the same time.

Option	Description
Open your Mac files and web links by using Windows applications	You can use applications in your virtual machine to open files that reside on your Mac. For example, you can open a Microsoft Word document stored on your Mac in a Microsoft Office application in your virtual machine.
Open your Windows files and web links using Mac applications	You can use your Mac applications to open files in your virtual machines.
Run Windows applications from your Mac's Applications folder	Find applications that you installed in Windows in your Mac's Applications folder or using Spotlight. This option requires VMware Tools. The virtual machine must be running to enable this option. This option is not available on shared virtual machines.

- (Optional) Click **Configure** to assign the applications used to manage mail, Web pages, and so on. See Set Default Applications Preferences.
- (Optional) Click **Restore Applications** to restore the applications listed in your Mac Application folder to only those that Windows does not include by default.

  If you deleted any of the Windows applications not included by default from the Mac Application folder, the deleted applications are restored.

  If you added any applications that are included by default to your Mac's application folder, those applications are deleted from the Mac Application folder.
- (Optional) Click **Clean Up Applications** to delete any Windows applications in the Mac Application folder that are not being used by any of your virtual machines.

App Nap Support

Fusion 7.0 or later supports the App Nap feature, which places UI applications running in the background in a reduced system resource state.

You do not have to disable App Nap for Fusion 7 or later.

Configuring Keyboard and Mouse Profiles

These profiles specify how Mac key combinations and mouse shortcuts are mapped to shortcuts on a virtual machine, including key combinations for Windows 8 shortcuts.

With keyboard and mouse profiles, you can also specify whether keyboard shortcuts are sent to your Mac instead of the virtual machine, and you can specify which Fusion-specific keyboard shortcuts to enable.

Although you can also create and edit keyboard and mouse profiles in Fusion preferences, you use virtual machine settings to select which profile to use for a particular virtual machine.

You can edit the default profiles provided by Fusion, or you can create additional profiles, either by adding a new one or by duplicating and editing one of the existing profiles.

- **Profile** maps common Macintosh key combinations such as ⌘+C and ⌘+X to their Windows and Linux counterparts, such as Control+C and Control+X, respectively.
- **Mac Profile** has very few keyboard mappings. Most keystrokes are passed directly to the macOS guest.
- **Windows 8 Profile** has a set of key mappings specifically for Windows 8 features, such as pressing Windows-C to open the Charms bar.

  Fusion includes a Windows 8 specific profile because many keyboard shortcuts specific to Windows 8 include the Windows key, which normally maps to the ⌘ key on macOS. Unfortunately, many of these ⌘ key combinations are also used for system hot keys in macOS. To avoid conflicts, the Windows 8 profile allows you to use the key combination ⌘+shift to map to the Windows key in Windows 8. You can, however, configure a different key combination.

Enable a CD/DVD Drive on a Remote Virtual Machine

You can enable a CD/DVD drive and select a disk image on a virtual machine hosted on a remote server. You can access or install software from a physical CD/DVD drive on to your remote virtual machine.

Prerequisites

Verify that the following conditions are met:

- You have login credentials for the server where the virtual machine is hosted.
- The virtual machine is powered on.

Procedure

1. Select **File > Connect to Server**.
2. Enter the name of the host server or select a server from the **Recent Servers** drop-down menu.
3. Enter your login credentials and click **Connect**.
4. Select **Virtual Machine > Settings**.
5. Click **CD/DVD Drive**.
6. Select the **Enable CD/DVD Drive** check box.
7. Select a remote disc image from the **Choose a remote disc image** drop-down menu.
8. (Optional) Expand **Advanced options** and select a bus type from the drop-down menu.
9. (Optional) Click **Remove CD/DVD Drive** to return to the CD/DVD drive that your virtual machine uses.

Enable a Floppy Drive on a Remote Virtual Machine

You can enable a floppy drive and select a disk image on a virtual machine hosted on a remote server. You can access or install software from a physical floppy drive on to your remote virtual machine.

Prerequisites

Verify that the following conditions are met:

- You have login credentials for the server where the virtual machine is hosted.
- The virtual machine is powered on.

Procedure

1. Select **File > Connect to Server**.
2. Enter the name of the host server or select a server from the **Recent Servers** drop-down menu.
3. Enter your login credentials and click **Connect**.
4. Select **Virtual Machine > Settings**.
5. Click **Floppy**.
6. Click the **Enable Floppy Drive** check box.
7. Select a floppy image from the drop-down menu.

View the Status of a Server or Remote Virtual Machine

You can view the power state, CPU use, and disk space use of a server or the configuration information of a remote virtual machine.

Prerequisites

Verify that you have login credentials for the server where the virtual machine is hosted. The server cannot be a vCenter Server host.

Procedure

1. Select **File > Connect to Server**.
2. Type the name of the server, or select a server from the **Recent Servers** drop-down menu.
3. Type your login credentials and click **Connect**.
4. Select a server to view CPU use, memory use, and available storage information.
5. Select a virtual machine to view snapshot, configuration file, and hardware compatibility information.

Configuring Display Resolution Settings

You can configure display resolution settings for your virtual machine to enable 3D accelerated graphics, retina display support, and single window and full screen settings.

Enable Accelerated 3D Graphics

On certain virtual machines, Fusion provides support for accelerated 3D graphics.

On virtual machines running Windows XP and later, Fusion provides support for DirectX 9.0c with Shader Model 3 and OpenGL 2.1 accelerated 3D graphics.

On virtual machines running Windows Vista and later, Fusion provides support for DirectX 10 with Open GL 3.3. Hardware version 12 is required.

On virtual machines running Linux, Fusion provides support for OpenGL 3.3 to support accelerated 3D graphics. Hardware version 12 is required. Linux kernel and Mesa 3D versions that support 3D accelerated graphics are required.

Prerequisites

Shut down or power off the virtual machine. You cannot change these settings while the virtual machine is powered on or suspended.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under System Settings in the **Settings** window, click **Display**.
4. Select the **Accelerate 3D graphics** check box.

   The version of DirectX supported by your hardware version is displayed.
5. Select the **Battery life** menu item from the drop-down menu.

   You can select the option to use high-performance graphics for 3D applications only to conserve battery life. You can select the menu item to always use high-performance graphics, but this selection results in shorter battery life.
6. Select the shared graphics memory item from the drop-down menu.

Enable Retina Display Support

The Retina display options control the appearance of virtual machines on displays with high pixel density.

Prerequisites

- Verify that you are using a Retina display or another high-pixel density display.
- Verify that you are using hardware version 11 or later. Hardware version 14 is recommended.
- Verify that the latest version of VMware Tools is installed.
- For best appearance and performance, in the Display pane of System Preferences on the Mac host, select **Best for Display** in OS X 10.9.5 or **Default for Display** in OS X 10.10 and later.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under System Settings in the **Settings** window, click **Display**.

4 Select the **Use full resolution for Retina display** check box.

When the **Use full resolution for Retina display** option is on, the virtual machine resolution is set to the full Retina display resolution.

When the **Use full resolution for Retina display** option is off, the virtual machine resolution is set to half of the Retina display resolution. This setting matches the non-Retina display size, but might appear pixelated.

5 Select the options for **Scaled high resolution**.

This option takes effect when an external non-Retina display is connected to a Mac with Retina display. The option adjusts the user-interface size on an extended non-Retina display to match the user-interface size on the Retina display.

Option	Description
Unity Only	Use high resolution scaling for Unity View only.
Unity and Full Screen	Use high resolution scaling for Unity View and Full Screen modes.
Unity and Single Window	Use high resolution scaling for Unity View and Single Window modes.
All View Modes	Use high resolution scaling for all view modes.

6 (Optional) Select the **Automatically adjust user interface size in the virtual machine** check box.

Applies to Windows virtual machines only.

Configure Resolution Settings for Virtual Machine Display

You can configure the resolution settings that determine how a virtual machine is displayed.

Prerequisites

- Verify that you are using a Retina display or another high-pixel density display.
- Verify that you are using hardware version 11 or later, preferably hardware version 12.
- Verify that the latest version of VMware Tools is installed.
- For best appearance and performance, select **Best for Display** in the Display pane of System Preferences on the Mac host.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under System Settings in the **Settings** window, click **Display**.

You use the Virtual Machine Resolution options to select the display settings for single window mode and full screen mode.

4 Select the **Single Window** resolution setting.

This setting specifies how the virtual machine displays in single window mode.

Option	Description
Use Fusion Display Preferences	Uses the global Fusion display preference setting. See Set Fusion Display Resolution Preferences.
Stretch the virtual machine in the window	When the virtual machine window is resized, the virtual machine display is stretched to fill the window with the resolution unchanged.
Resize the virtual machine and the window	The virtual machine display is resized to fit the single window.

5 Select the **Full Screen** resolution setting.

This setting specifies how the virtual machine is displayed in full screen mode.

Option	Description
Use Fusion Display Preferences	Uses the global Fusion display preference setting. See Set Fusion Display Resolution Preferences.
Center the virtual machine in the screen	When the virtual machine enters Full Screen view mode, the virtual machine display is centered on the screen with the resolution unchanged.
Stretch the virtual machine in the screen	When the virtual machine enters Full Screen view mode, the virtual machine display is stretched to fill the screen space with the resolution unchanged.
Resize the virtual machine to fit the screen	The virtual machine display is resized to fit the full screen.

Enable Hot Keys for Virtual Machines

If you have Fusion Pro, you can create a keyboard shortcut to define a hot key combination to launch a virtual machine.

- The hot key combination must contain at least one key modifier, such as Control or Command, plus another modifier.
- A hot key combination must be unique to one virtual machine.
- The hot key cannot be a function or a specially defined key such as Return, Escape, Insert, Delete, Home, End, Page Up, Page Down, F key, Print Screen, Scroll Lock, Pause, or the arrow keys.
- You cannot assign a hot key combination to an application.
- You cannot use the Tab key as a hot key.

Procedure

1 Select **VMware Fusion > Preferences**.

2 Select the **Enable per-virtual machine keyboard shortcuts** check box.

3 Select **Window > Virtual Machine Library**.

4 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

5 Under System Settings in the **Settings** window, click **Keyboard & Mouse**.

6 Type the keyboard shortcut to use to trigger the virtual machine.

Configure Discrete Graphics Management

With discrete graphics management, you can manage battery use and performance of applications that use 3D graphics in a virtual machine.

Prerequisites

- Verify that your MacBook Pro has an integrated graphics card and a discrete graphics card. Discrete graphics management enables the operating system to switch between the two cards.
- Verify that 3D graphics are enabled.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under System Settings in the **Settings** window, click **Display**.

4 Verify that the **Accelerate 3D Graphics** check box is selected.

5 Select a graphics performance option from the **Battery life** drop-down menu.

Option	Description
Don't Use High Performance Graphics (Longer Battery Life)	Maximizes battery life.
Use High Performance Graphics for 3D Applications Only	Balances battery life and 3D graphics performance.
Always Use High Performance Graphics (Shorter Battery Life)	Minimizes battery life.

Set the Default Printer for a Virtual Machine

When you use Fusion, all printers installed on your Mac are automatically added to your virtual machine.

Your virtual machine uses the default printer on the Mac as its default printer, unless you change it on the Printer panel in Settings.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under Removable Devices in the **Settings** window, click **Printer**.

4 Select the **Share Mac printers** check box.

5 Select the default printer for this virtual machine.

Option	Description
Match the default printer on the Mac	Print jobs from this virtual machine go to the printer set as default on your Mac.
Allow a different default printer	Print jobs from this virtual machine go to the printer you set as default using the virtual machine's operating system preferences. For example, you set the printer default by selecting **Start > Control Panel > Devices and Printers** in a Windows 10 virtual machine.

Print jobs go to the configured default printer.

In most cases, you can ignore the **Remove Printer Port** button. When you add a virtual printer to a virtual machine, Fusion adds a virtual serial port for the virtual machine. Fusion then uses the serial port to communicate with the virtual printer. Selecting **Remove Printer Port** removes both the virtual printer and the virtual serial port from the virtual machine.

Add a Device

You can add removable devices to use with your virtual machine.

You can add the following devices to a virtual machine:

- network adapters
- hard disks
- camera
- CD/DVD
- sound card
- USB and Bluetooth
- serial ports
- parallel ports
- Trusted Platform Module device

Configuring the Network Connection

Configure and implement Fusion virtual networking components on your virtual machine to connect to other virtual machines in your networking environment.

Fusion supports only Ethernet-based networking, but provides several options for connecting to networks.

- A virtual machine can use NAT to share the IP address of your host system.
- You can configure a virtual machine to bridge to a specific network interface on the host system. Fusion supports IPv6 in bridged networking.

- You can create a VPN that includes only the virtual machines on your host system.

In Fusion, when you edit settings for a virtual network adapter, you can choose from several types of network connections.

Table 8-2. Network Connection Options

Option	Description
Share with my Mac	If you want to connect to the Internet or other TCP/IP network using your Mac dial-up networking connection and you are not able to give your virtual machine an IP address on the external network, choosing this option is often the easiest way to give the virtual machine access to that network. The virtual machine does not have its own IP address on the external network. The virtual machine obtains a private IP address from the VMware virtual DHCP server.
Bridged Networking items	In the Bridged Networking list, you see various choices for bridging to one of the network interfaces on your Mac, including wireless and Ethernet. Using one of these options is often the easiest way to give your virtual machine access to a network. With one of these bridged networking options, the virtual machine appears as an additional computer on the same physical Ethernet network as your Mac. The virtual machine can use any of the services available on the network to which it is bridged, including file servers, printers, gateways, and so on. Likewise, any physical host or other virtual machine configured with bridged networking can use resources of that virtual machine.
Private to my Mac	When you use this type of network connection, the virtual machine is connected to your Mac's operating system on a virtual private network, which normally is not visible outside your Mac. Multiple virtual machines configured with host-only networking on the same Mac are on the same network.

- Connect and Set Up the Network Adapter

  You can connect the virtual network adapter for the virtual machine and set the type of networking to use.

- Assign a MAC Address to a Virtual Machine Manually

  You can assign a MAC address manually if you need to ensure that the same MAC address is always assigned to the virtual network adaptor for a virtual machine.

- Add a Network Adapter

  You can add up to ten virtual network adapters to a virtual machine.

- Change the Network Adapter on a Remote Virtual Machine

  You can enable and change the virtual network adapter for a virtual machine hosted on a remote server. Your virtual machine will have access to multiple networks.

- Remove a Network Adapter

  You can remove network adapters from your virtual machine.

- Simulate a Network Environment with Fusion Pro

  In Fusion Pro, you can use advanced virtual network adapter settings to limit the bandwidth, specify the acceptable packet loss percentage, and create network latency for incoming and outgoing data transfers for a virtual machine.

Connect and Set Up the Network Adapter

You can connect the virtual network adapter for the virtual machine and set the type of networking to use.

Prerequisites

Fusion does not support bridged networking to a VPN. If you have set a VPN to have the top priority in your Mac system preferences, lower its priority if you intend to use bridged networking with autodetect in your virtual machine.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under Removable Devices in the **Settings** window, click **Network Adapter**.
4. Select the **Connect Network Adapter** check box.

   Fusion retains and reapplies the setting you select when you start up the virtual machine.
5. Select the networking type.

Option	Description
Share with my Mac	The virtual machine does not have its own IP address on the external network. The virtual machine obtains a private IP address from the VMware virtual DHCP server.
Bridged Networking items	You see various choices for bridging to one of the network interfaces on your Mac, including wireless and Ethernet. Using one of these options is often the easiest way to give your virtual machine access to a network. When you select any of the network types other than Autodetect, you can click **System Preferences** to see details of the physical network settings for your host system.
Private to my Mac	The virtual machine is connected only to the host operating system, using a virtual private network, which is not visible outside your Mac.

Assign a MAC Address to a Virtual Machine Manually

You can assign a MAC address manually if you need to ensure that the same MAC address is always assigned to the virtual network adaptor for a virtual machine.

Assign a MAC address manually instead of allowing Fusion to assign it to be sure that the following situations occur:

- The same MAC address is always assigned to the virtual network adaptor for a given virtual machine, even if the virtual machine is moved.
- A unique MAC address for each virtual machine within a networked environment

When a physical machine is converted to a virtual machine, the MAC address of the network adapter is changed. For software in which the licensing is linked to the MAC address, this can be a problem. Manually assigning the correct MAC address is the solution.

Prerequisites

Shut down or power off the virtual machine. You cannot change the setting while the virtual machine is powered on or suspended.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under Removable Devices in the **Settings** window, click **Network Adapter**.
4. Click **Advanced options**.
5. Enter a new MAC address.
   - Type a known MAC address.
   - Click **Generate** for Fusion to create a unique address.

Add a Network Adapter

You can add up to ten virtual network adapters to a virtual machine.

Prerequisites

- Familiarize yourself with the various types of network configurations. See Configuring the Network Connection.
- Shut down or power off the virtual machine. You cannot change the setting while the virtual machine is powered on or suspended.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Click **Add Device**.
4. Click **Network Adapter**.
5. Click **Add**.
6. Either select a network configuration from the list or, if you have Fusion Pro, click **Configure** below the list to create a new network.

What to do next

For more information about creating a custom network, see Creating Custom Networks. For more information about configuring a new network adapter, see Connect and Set Up the Network Adapter.

Change the Network Adapter on a Remote Virtual Machine

You can enable and change the virtual network adapter for a virtual machine hosted on a remote server. Your virtual machine will have access to multiple networks.

Prerequisites

Verify that the following conditions are met:

- You have login credentials for the server where the virtual machine is hosted.
- The virtual machine is powered on.

Procedure

1. Select **File > Connect to Server**.
2. Enter the name of the host server or select a server from the **Recent Servers** drop-down menu.
3. Enter your login credentials and click **Connect**.
4. Select **Virtual Machine > Settings**.
5. Click **Network Adapter**.
6. Select the network adapter from the **Network Connection** drop-down menu.

Remove a Network Adapter

You can remove network adapters from your virtual machine.

Prerequisites

Shut down or power off the virtual machine. You cannot change the setting while the virtual machine is powered on or suspended.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under Removable Devices in the **Settings** window, click **Network Adapter**.
4. Under Advanced options, click **Remove Network Adapter**.
5. Click **Remove** in the confirmation dialog box.

Simulate a Network Environment with Fusion Pro

In Fusion Pro, you can use advanced virtual network adapter settings to limit the bandwidth, specify the acceptable packet loss percentage, and create network latency for incoming and outgoing data transfers for a virtual machine.

The advanced virtual network adapter settings allow you to simulate a network environment that differs from your own.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under Removable Devices in the **Settings** window, click **Network Adapter**.

4 Expand **Advanced options**.

5 Select incoming and outgoing bandwidth settings.

This setting allows you to simulate network bandwidth.

Option	Description
Limit incoming or outgoing data transfers to the data transfer rate for a specific network connection type	Select the network connection type from the **Bandwidth** drop-down menu. The value in the **Kbps** text box changes to the data transfer rate, in kilobits per second, of the network connection type that you select. For example, if you select **Leased Line T1 (1.544 Mbps)**, the value in the **Kbps** text box changes to 1544.
Limit incoming or outgoing data transfers to a specific data transfer rate	Select **Custom** and type the data transfer rate, in kilobits per second, in the **Kbps** text box.

6 Enter the acceptable packet loss percentage for incoming and outgoing data transfers in the **Packet Loss (%)** text box.

This setting allows you to simulate network packet loss. The default setting is 0.0%. The packet loss range is 0 to 100%.

7 Enter numbers to set the latency in milliseconds for incoming and outgoing data transfers.

This setting allows you to simulate network latency. The latency range is 0 to 2,000 ms.

Managing Virtual Hard Disks

You can add, remove, and resize virtual hard disks.

If you want to add more disk space to your virtual machine, you can resize your existing virtual hard disk, or add a separate, additional hard disk.

Note Having manual or AutoProtect snapshots in your virtual machine prevents you from making changes to a virtual hard disk. You must delete the snapshots before you can make a change.

Changing the Bus Type of the Virtual Hard Disk

Caution In the following situations, after you select a bus type for a virtual hard disk, do not change the bus type.

- On a system boot disk with the operating system installed

  Some operating systems are incapable of changing the storage controller of the boot device.

- A virtual machine created using Easy Install

  When you select **Customize Settings** at the end of an Easy Install configuration and change the hard disk to a non-default bus type, the operating system might fail.

Create a Virtual Hard Disk

You might require more disk space in a virtual machine. For example, if you want to install a large application or work with a large number of files. You can increase the size of the virtual disk already associated with your virtual machine, or you can add a new virtual disk. You can create a virtual hard disk to add to a virtual machine.

Prerequisites

Shut down or power off the virtual machine. You cannot change the setting while the virtual machine is powered on or suspended.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Click **Add Device**.
4. Click **New Hard Disk**.
5. Click **Add**.

   A new hard disk appears. The new hard disk is selected and a default filename appears in the **File name** pop-up menu.
6. (Optional) Change the filename for the new virtual hard disk.
   a. Select the filename in the pop-up menu and select **Save As**.
   b. Type the filename for the hard disk in the **Save as** field and click **Save**.

   Fusion creates the virtual disk file with this name and stores it in the App bundle directory.
7. Use the **Disk size** slider to set the maximum size for the hard disk.

   The maximum size for any hard disk is 8 TB.
8. (Optional) Under Advanced options, set the **Bus type** for the hard disk to **IDE**, **SCSI**, **SATA**, or **NVMe**.

   Note If the guest operating system does not support NVMe, the NVMe option is disabled.

   Changing this setting is recommended only for advanced users. Fusion selects the bus type that is most appropriate for the virtual machine guest operating system.

9 Set your disk space configuration, depending on the constraints of the file system.

Option	Description
Pre-allocate disk space	Can give better performance for your virtual machine. If you allocate all the disk now, you cannot use the VMware Tools shrink disk feature later. Allocating all disk space now is a time-consuming operation that cannot be canceled. Also, the allocation process requires as much physical disk space as you specify for the virtual disk.
Split disk into multiple files	Default. Some file systems, such as FAT and UFS, cannot support very large files. Use this option if your virtual machine will be used in a hard drive with a file system that does not support very large files. This option splits your virtual disk into multiple files. Also, use this option if you might place the virtual machine on an external FAT drive or if you might move the virtual machine to an external drive.

10 Click **Apply**.

The hard disk is created. View the new hard disk in **Settings > Removable Devices** of the virtual machine.

Resize a Hard Disk

You can increase the usable space in a virtual hard disk. You cannot reduce the size of a hard disk. You cannot make a blank hard disk smaller after it has been formatted.

Prerequisites

Having manual or AutoProtect snapshots in your virtual machine prevents you from making changes to a virtual hard disk. You must delete the snapshots before you can make a change.

Shut down or power off the virtual machine. You cannot change the setting while the virtual machine is powered on or suspended.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 In the **Settings** window, click the hard disk you want to resize.

4 Use the **Disk size** slider to set the new size.

The maximum disk size for any hard disk is 8TB.

5 (Optional) Under Advanced options, set the **Bus type** for the hard disk to **IDE**, **SCSI**, **SATA**, or **NVMe**.

Note If the guest operating system does not support NVMe, the NVMe option is disabled.

Changing this setting is recommended only for advanced users. Fusion selects the bus type that is most appropriate for the virtual machine guest operating system.

6 Set your disk space configuration, depending on the constraints of the file system.

Option	Description
Pre-allocate disk space	Can give better performance for your virtual machine. If you allocate all the disk now, you cannot use the VMware Tools shrink disk feature later. Allocating all disk space now is a time-consuming operation that cannot be canceled. Also, the allocation process requires as much physical disk space as you specify for the virtual disk.
Split disk into multiple files	Default. Some file systems, such as FAT and UFS, cannot support very large files. Use this option if your virtual machine will be used in a hard drive with a file system that does not support very large files. This option splits your virtual disk into multiple files. Also, use this option if you might place the virtual machine on an external FAT drive or if you might move the virtual machine to an external drive.

7 Apply the changes and choose automatic or manual partition resize for Windows guests.

Option	Description
Click Apply.	For Windows guests, the partition is automatically resized when the hard disk is resized.
Click Apply while pressing the Option key.	The hard disk is resized but the partition is not. To manually resize the partition of the guest, see Resize a Windows Partition with the Disk Management Tool.

Fusion displays a progress dialog box as it rebuilds the virtual disk.

Resize a Windows Partition with the Disk Management Tool

When you enlarge your virtual hard disk, you must also enlarge your guest operating system's partition to take advantage of the additional space.

Fusion resizes the guest operating system's partition when you resize the virtual hard disk. If you held down the **Option** key when you clicked **Apply** to resize the disk, you can manually resize the Windows partition. For Windows Vista and Windows 7 or later, you can use the operating system's Disk Management tool to resize a partition.

Prerequisites

Verify that your virtual hard disk is big enough to accept the increase in partition size. See Resize a Hard Disk.

Procedure

1 Right-click **Computer** and select **Manage**.

2 Double-click **Storage**.

3 Double-click **Disk Management**.

4 In the list, right-click the partition to expand and select **Extend Volume**.

5 Follow the prompts to resize the partition and click **Finish**.

The partition item in the Disk Management pane displays its new size.

6 Close the **Computer Management** window

Clean up a Virtual Machine

You can perform a manual or automated cleanup of certain virtual machines to free up space on your Mac. The cleanup compacts and defragments the virtual machine.

When you delete files from your virtual machine, Fusion does not return the space to your Mac. Cleaning up the virtual machine performs the following operations:

- Compacts the virtual machine and returns freed space to your Mac.

  Note Only Windows virtual machines return freed space to your Mac.

- Defragments the virtual machine.
- Consolidates any unconsolidated snapshot files left on the virtual machine. Unconsolidated snapshot files can be left on the virtual machine when manually deleting a snapshot fails.

Cleanup is not supported for encrypted virtual machines.

Prerequisites

To perform a manual cleanup, shut down or power off the virtual machine. You cannot perform the manual cleanup while the virtual machine is powered on or suspended.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under System Settings in the **Settings** window, click **General**.

4 Select a cleanup option.

Manual	Click **Clean Up Virtual Machine**. This option is only available when a Windows virtual machine has disk space to reclaim, or when any virtual machine has unconsolidated snapshot files. Fusion displays a progress dialog box as it cleans up the virtual machine.
Automated	Select **Clean up disks after shutting down virtual machine**. Fusion cleans up the virtual machine every time the virtual machine is shut down.

Add an Existing Virtual Hard Disk

You can add an existing virtual hard disk to a virtual machine. You can copy or move the disk to your virtual machine, or share it between virtual machines.

Caution Moving the virtual hard disk can break other virtual machines that are using the virtual hard disk, because this is the equivalent of removing the hard disk from one physical computer and installing it in another.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Click **Add Device**.

4 Click **Existing Hard Disk**.

5 Click **Add Device**.

6 In the Open dialog, navigate to the location of the existing `.vmdk` hard disk file.

7 Select the method for adding the virtual hard disk file.

Option	Description
Make a separate copy of the virtual disk	Default. Copies the virtual hard disk file to this virtual machine's package. Copying the virtual hard disk ensures that no conflicts exist between this virtual machine and any other virtual machine that might be using the virtual hard disk.
Share this virtual disk with the virtual machine that created it	Virtual hard disk file remains in its original location. This might cause a conflict if it is also being used by that original virtual machine.
Take this disk away from the virtual machine currently using it	Moves the virtual hard disk file to this virtual machine's package.

8 Click **Open**.

9 Click **Apply**.

Fusion displays a progress dialog box if you select to copy the virtual disk.

Add a VMDK on a Remote Virtual Machine

You can add a virtual hard disk and select a disk image on a virtual machine hosted on a remote server.

Prerequisites

Verify that the following conditions are met:

- You have login credentials for the server where the virtual machine is hosted.
- The virtual machine is powered off.

Procedure

1 Select **File > Connect to Server**.

2 Enter the name of the host server or select a server from the **Recent Servers** drop-down menu.

3 Enter your login credentials and click **Connect**.

4 Select **Virtual Machine > Settings**.

5 Click **Add Device**.

6 Click **Hard Disk**.

7 Select a `.vmdk` file from the **File name** drop-down menu.

8 Use the disk size slider to specify the size of the virtual disk.

9 (Optional) Expand **Advanced options** and select a bus type and choose how to allocate the disk space.

Remove a Hard Disk

You can remove a virtual hard disk from your virtual machine.

Prerequisites

Shut down or power off the virtual machine. You cannot change the setting while the virtual machine is powered on or suspended.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 In the **Settings** window, click the hard disk to remove from the virtual machine.

4 Under Advanced options, click **Remove Hard Disk**.

5 In the confirmation window, select the option for removing the hard disk.

Option	Description
Keep File	The virtual hard disk is disconnected from the virtual machine, but the hard disk files remain in the virtual machine package.
Move to Trash	The virtual hard disk files are deleted from the virtual machine package.

Using Virtual DiskManager

Virtual Disk Manager (`vmware-vdiskmanager`) is a Fusion utility that you can use to create, manage, and modify virtual disk files from the command line or in scripts.

Virtual Disk Manager is included when Fusion is installed. With Virtual Disk Manager, you can enlarge a virtual disk so that its maximum capacity is larger than it was when you created it. This feature is useful if you need more disk space in a given virtual machine, but do not want to add another virtual disk or use ghosting software to transfer the data on a virtual disk to a larger virtual disk.

You can also use Virtual Disk Manager to change how disk space is allocated for a virtual hard disk. You can preallocate all the disk space in advance or configure the disk to grow as more disk space is needed. If you allocate all the disk space but later need to reclaim some hard disk space on the host system, you can convert the preallocated virtual disk into a growable disk. The new virtual disk is still large enough to contain all the data in the original virtual hard disk. You can also change whether the virtual hard disk is stored in a single file or split into 2GB files.

The Virtual Disk Manager file, `vmware-vdiskmanager`, is located in the `Applications/VMware Fusion.app/Contents/Library` directory.

Configuring the CD/DVD Drive

You can connect the virtual machine's CD/DVD drive to the Mac physical CD/DVD drive or to a CD or DVD ISO image.

- Add a CD/DVD Drive

  You can add a virtual CD/DVD drive to a virtual machine.

- Remove a CD/DVD Drive

  You can remove a physical or virtual CD/DVD drive from your virtual machine.

- Connect and Set Up a CD/DVD Drive

  You can set up a CD/DVD drive so that it is always detected, or so that you must connect it manually.

- Connect and Disconnect the CD/DVD Drive Without Using the Settings Window

  You can use the buttons on the status bar to connect and disconnect devices.

- Create a CD/DVD Image

  You can use the Apple Disk Utility to create CD/DVD disk images.

- Enable a CD/DVD Drive on a Remote Virtual Machine

  You can enable a CD/DVD drive and select a disk image on a virtual machine hosted on a remote server. You can access or install software from a physical CD/DVD drive on to your remote virtual machine.

Add a CD/DVD Drive

You can add a virtual CD/DVD drive to a virtual machine.

Prerequisites

Shut down or power off the virtual machine. You cannot change the setting while the virtual machine is powered on or suspended.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Click **Add Device**.
4. Click **CD/DVD Drive**.
5. Click **Add**.

6 Configure the drive.

Option	Description
Automatically detect physical CD/DVD	The virtual machine detects your Mac CD/DVD drive.
Specify physical CD/DVD	Directs the virtual machine's CD/DVD drive to a physical drive.
Use disk image	Directs the virtual machine's CD/DVD drive to an ISO image. Click the pop-up menu to browse for and select the ISO image file.

Remove a CD/DVD Drive

You can remove a physical or virtual CD/DVD drive from your virtual machine.

Prerequisites

Shut down or power off the virtual machine. You cannot change the setting while the virtual machine is powered on or suspended.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under Removable Devices in the **Settings** window, click the CD/DVD drive to remove.

4 Under Advanced options, click **Remove CD/DVD Drive**.

Connect and Set Up a CD/DVD Drive

You can set up a CD/DVD drive so that it is always detected, or so that you must connect it manually.

You can disable the Automatically detect physical CD/DVD feature while the virtual machine is powered on, but you must power off the virtual machine before you can enable this feature. Use the **Shut Down** command in the Virtual Machine menu.

If your CD/DVD drive is a USB device, Fusion handles it as a USB device, not a CD/DVD drive. See Configuring the USB Controller and Connecting USB Devices.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under Removable Devices in the **Settings** window, click the CD/DVD drive to connect.

4 Select the **Connect CD/DVD Drive** check box.

Connect and Disconnect the CD/DVD Drive Without Using the Settings Window

You can use the buttons on the status bar to connect and disconnect devices.

Procedure

- Click the CD/DVD device button in the status bar.

Create a CD/DVD Image

You can use the Apple Disk Utility to create CD/DVD disk images.

Procedure

1. Start the Mac Disk Utility by going to `Applications/Utilities/Disk Utility` on your Mac.
2. Insert the CD/DVD for which you need an image.
3. In the **Disk Utility** window, select the CD/DVD disk and click **New Image**.
4. In the Image Format pop-down menu, select **DVD/CD Master**
5. In the Encryption pop-down menu, select **None**.
6. Save the CD/DVD image to the chosen location.

What to do next

To attach the images to a virtual machine, see Connect and Set Up a CD/DVD Drive.

Enable a CD/DVD Drive on a Remote Virtual Machine

You can enable a CD/DVD drive and select a disk image on a virtual machine hosted on a remote server. You can access or install software from a physical CD/DVD drive on to your remote virtual machine.

Prerequisites

Verify that the following conditions are met:

- You have login credentials for the server where the virtual machine is hosted.
- The virtual machine is powered on.

Procedure

1. Select **File > Connect to Server**.
2. Enter the name of the host server or select a server from the **Recent Servers** drop-down menu.
3. Enter your login credentials and click **Connect**.
4. Select **Virtual Machine > Settings**.
5. Click **CD/DVD Drive**.
6. Select the **Enable CD/DVD Drive** check box.
7. Select a remote disc image from the **Choose a remote disc image** drop-down menu.
8. (Optional) Expand **Advanced options** and select a bus type from the drop-down menu.
9. (Optional) Click **Remove CD/DVD Drive** to return to the CD/DVD drive that your virtual machine uses.

Configuring a Floppy Device

You can add a virtual floppy device to a virtual machine and configure the floppy device to connect to a floppy image file.

You can also connect and disconnect the floppy device in Fusion. A virtual machine can have no more than two floppy devices.

Add a Floppy Device

You can add a floppy device to your virtual machine to access data on a floppy disk image file.

Prerequisites

Shut down or power off the virtual machine. You cannot change the setting while the virtual machine is powered on or suspended.

You must have a floppy image file with one of the following filename extensions:

- `.flp`
- `.img`
- `.dsk`
- `.fdd`

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Click **Add Device**.
4. Click **Floppy Drive**.
5. Click **Add**.
6. Browse to the floppy image file and select it.
7. Click **Open**.

What to do next

Configure the new floppy device, as described in Connect and Set Up a Floppy Device.

Connect and Set Up a Floppy Device

You can configure how your virtual machine can use a floppy device to access data on a floppy disk image file.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Click **Add Device**.

4 Select the floppy device in the source list in the Other Devices panel.

5 Select or deselect the **Connected** check box to connect or disconnect the floppy device.

6 (Optional) Select **Read only** to make the contents of the floppy device read-only.

7 Select **Use floppy image** and click **Choose** to browse for the floppy image file to connect the floppy device to a floppy image file.

   If you are working with a virtual machine that is configured to use a physical floppy drive, or any type of floppy device other than a floppy image file, the **Use a custom unsupported setting** option is selected. Fusion supports only floppy image files for use with a virtual floppy device.

Create a Floppy Disk Image

To read data from a floppy disk to a virtual machine, you must create a disk image that the virtual machine can recognize.

Some operating systems require you to use floppy disks to install them. Because the Mac does not include a physical floppy drive, and because Fusion supports floppy images only, you must use a USB floppy drive to create floppy images.

The Apple Disk Utility can create floppy disk images for this purpose.

Procedure

1 Attach a USB floppy drive to your Mac.

2 Start the Mac Disk Utility by going to `Applications/Utilities/Disk Utility` on your Mac.

3 Insert the floppy disk for which you need an image.

4 In the **Disk Utility** window, select the floppy disk and click **New Image**.

5 In the **Image Format** pop-up menu, select **read/write**.

6 In the **Encryption** pop-up menu, select **None**.

7 Save the floppy disk image to the chosen location.

8 In the Finder, right-click on the created floppy image and select **Get Info**.

9 In **Name & Extension**, change the file extension from `.dmg` to `.flp` and close the **Get Info** window.

   Confirm the change when prompted.

10 (Optional) Repeat the process for each floppy disk to create.

What to do next

To attach the images to a virtual machine, see Connect and Set Up a Floppy Device.

Enable a Floppy Drive on a Remote Virtual Machine

You can enable a floppy drive and select a disk image on a virtual machine hosted on a remote server. You can access or install software from a physical floppy drive on to your remote virtual machine.

Prerequisites

Verify that the following conditions are met:

- You have login credentials for the server where the virtual machine is hosted.
- The virtual machine is powered on.

Procedure

1. Select **File > Connect to Server**.
2. Enter the name of the host server or select a server from the **Recent Servers** drop-down menu.
3. Enter your login credentials and click **Connect**.
4. Select **Virtual Machine > Settings**.
5. Click **Floppy**.
6. Click the **Enable Floppy Drive** check box.
7. Select a floppy image from the drop-down menu.

Configuring the Sound Card

A virtual machine can have only one sound card. You can add a sound card only if you remove the existing sound card.

Connect the Sound Card

You can enable your virtual machine to use the Mac's sound device.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under Removable Devices in the **Settings** window, click **Sound Card**.
4. Select the **Connect Sound Card** check box.
5. Select the **Output Device** and **Input Device**
6. (Optional) Select the **Enable Echo Cancellation** check box if there is sound echo in your virtual machine.

Connect and Disconnect a Sound Adapter Without Using the Settings Window

You can use the buttons on the status bar to connect and disconnect devices.

Procedure

- Click the sound device button in the status bar.

Add a Sound Adapter

You can add a sound adapter if one was previously removed.

Prerequisites

Shut down or power off the virtual machine. You cannot change the setting while the virtual machine is powered on or suspended.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Click **Add Device**.
4. Click **Sound Card** and click **Add**.
5. Select the output and input device to add.

Remove a Sound Adapter

Before you can add a new sound adapter, you must remove the existing one.

Prerequisites

Shut down or power off the virtual machine. You cannot change the setting while the virtual machine is powered on or suspended.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under Removable Devices in the **Settings** window, click **Sound Card**.
4. Click **Remove Sound Card**.
5. Click **Remove** in the confirmation dialog box.

Add a Camera to a Virtual Machine

You can enable one or more cameras on a virtual machine.

Prerequisites

Verify that the following conditions are met:

- You have one or more cameras on the host system, either built-in or connected to a USB device.
- The virtual machine uses hardware version 11 or later.
- The virtual machine is local to your Mac, rather than hosted on a remote server.

Procedure

1 Select **Virtual Machine > Settings**.

2 Click **Add Device**.

3 Select **Camera**.

4 Click **Add**.

Ordinarily, the default camera of the host system is added to the virtual machine. You can select a camera by name. If a named camera is chosen, the camera of your virtual machine is connected explicitly to that camera. In that case, the camera might not connect if you move the virtual machine to another host, or if you remove the named camera from the host system.

Configuring the USB Controller and Connecting USB Devices

You can configure the virtual USB controller to enable USB 3.0 and 2.0 support. You can also configure the virtual USB controller to connect USB devices to the virtual machine when such devices are connected to the Mac while the virtual machine is active. The settings you select can persist across several VMware products, such as Workstation Pro and VMware Horizon 6.

If you have a Mac that supports connecting USB 3.0 devices, guest operating systems can connect to USB 3.0 devices as USB 3.0 and connect to USB 2.0 devices as USB 2.0. However, guests with virtual USB 2.0 hardware will have issues when connecting to USB 3.0 devices. An example of a guest operating system that does not have virtual USB 3.0 hardware is Windows XP. Depending on the specific device, performance might be slow or partial, or the device might fail to connect.

Guests on older Macs can have virtual USB 3.0 virtual hardware, but both USB 2.0 and USB 3.0 devices will connect in USB 2.0 mode. Guests with virtual USB 2.0 hardware will also use USB 2.0 mode for USB 2.0 and USB 3.0 devices.

Note Fusion does not support USB adapters for connecting displays to your virtual machines.

Add the USB Controller

You can add a virtual USB controller to allow your virtual machine to work with the USB devices that are connected to your Mac.

Prerequisites

Shut down or power off the virtual machine. You cannot change the setting while the virtual machine is powered on or suspended.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under Removable Devices in the **Settings** window, click **USB & Bluetooth**.

4 Under Advanced USB options, use the drop-down menu to select how Fusion should respond when a USB device is plugged in to your Mac.

Note Support for USB 3.0 SuperSpeed devices requires a suitably equipped Mac and a guest operating system that supports USB 3.0 devices.

Remove the USB Controller

You can remove a USB controller from your virtual machine.

When you remove the USB controller, you cannot connect a USB device to the virtual machine.

Prerequisites

Shut down or power off the virtual machine. You cannot change the setting while the virtual machine is powered on or suspended.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under Removable Devices in the **Settings** window, click **USB & Bluetooth**.

4 Under Advanced USB options, click **Remove USB Controller**.

5 Click **Remove** in the confirmation dialog box.

Choose Where to Connect a USB Device When You Plug It In

When a virtual machine is running, you can select whether a USB device connects to your Mac or to your virtual machine when you plug the device in.

With Fusion, you can select what system a USB device connects to when you plug it in. You can also set that choice as the default connection whenever you attach that device in the future.

Prerequisites

Fusion must be open, with a virtual machine powered on.

Procedure

1 Plug the USB device into your Mac.

The selection dialog box appears. If no dialog box appears, you already set a default connection for this device in the USB settings panel.

2 (Optional) To make your connection selection the default for this device in the future, select **Remember my choice and do not ask again**.

You can change this default at any time in the USB & Bluetooth settings panel.

3 Select the system to which you want to connect the device.

The action you take depends on how many virtual machines are open.

Option	Description
If you have one virtual machine powered on	Select **Connect to Mac** or **Connect to *OS of your open virtual machine***.
If you have two or more virtual machines powered on	In the pop-up menu, select **Connect to your Mac** or **Connect to *virtual machine name*** for the selected virtual machine. Click **OK**.

Set the Default Plug-In Action for a USB Device

You can set whether a USB device connects to your Mac or to your virtual machine whenever you attach the device.

This setting can be different for each virtual machine. If you set the default plug-in action for a virtual machine, but the virtual machine is not powered on when you attach the device, the device attaches to the Mac.

Prerequisites

Fusion must be open, with a virtual machine powered on.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under Removable Devices in the **Settings** window, click **USB & Bluetooth**.

4 Select the USB device in the list.

5 Under Advanced USB options, select the plug-in behavior for the device.

Option	Description
Ask what to do	Fusion asks if you want to attach the device to the Mac or the virtual machine.
Connect to this virtual machine	Only the virtual machine recognizes the device. The Mac does not recognize the device.
Connect to your Mac	Only the Mac recognizes the device. The virtual machine does not recognize the device. This option is the default behavior. VMware recommends that printers connect to the host, not to the guest.

Connect and Disconnect USB Devices

You can connect USB devices to your virtual machines through your Mac.

Connecting a USB device to the virtual machine makes the USB device unavailable to your Mac.

If your CD/DVD drive is a USB device, Fusion handles it as a USB device, not a CD/DVD drive.

Prerequisites

If you disconnect a USB device and reconnect it right away, it will reconnect to the virtual machine that it was previously connected to. To change the connection, reconnect to a different USB port on your Mac.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Under Removable Devices in the **Settings** window, click **USB & Bluetooth**.

3 In the Connect USB devices section, select or deselect the check box next to the USB device to connect or disconnect that device.

Connect and Disconnect a USB Device Using the Virtual Machine Toolbar

You can use the buttons on the status bar to connect and disconnect devices.

Procedure

1 Click the device button in the status bar.

2 Click **Connect *name of device***.

Connect a USB Smart Card Reader

You connect a USB smart card reader with a process different from the process used for other USB devices.

When you attach a smart card reader to your computer, the reader appears as two separate USB devices in the Fusion interface. You can use smart cards in virtual mode or USB passthrough mode. These mode are mutually exclusive. You must pick one or the other.

- Virtual mode (Recommended): The smart card reader device is available as Virtual *model name of your smart card reader* USB Smart Card Reader. After the virtual reader is connected to the virtual machine, it appears as **Virtual *the model name of your smart card reader* USB Smart Card Reader** under the device list in the guest operating system. In virtual mode, the smart card reader can be shared among applications on the host and among applications within different guests on the host.
- USB passthrough mode: The smart card reader device is available as *model name of your smart card reader* USB Smart Card Reader. When you connect the reader to the guest, it appears as ***model name of the smart card reader* USB Smart Card Reader** under the device list in the guest operating system. In USB passthrough mode, a single virtual machine directly controls the physical smart card reader. A USB passthrough smart card reader cannot be used by applications on the host or by applications within other virtual machines. Use USB passthrough mode only if connection in virtual mode does not work well for your computing environment.

Note Disconnect your current mode before you switch to a different mode.

Procedure

- For virtual mode, select **Virtual Machine > USB & Bluetooth > Connect *the model name of your smart card reader* USB Smart Card Reader**.

  When you select the virtual mode device, the passthrough mode ***the model name of your smart card reader* Smart Card Reader** device no longer appears, except in Linux virtual machines.
- For USB passthrough mode, select **Virtual Machine > USB & Bluetooth > Connect *the model name of your smart card reader* USB Smart Card Reader**.
- To disconnect either mode, select **Virtual Machine > USB & Bluetooth** and the device to disconnect, and click **Disconnect**.

USB Connection Dialog Box Disappears Before Connection Can Be Made

In rare cases, a USB device disconnects itself before Fusion can recognize it.

Problem

When you plug in a USB device, the Fusion EasyConnect dialog box appears, but disappears before you have an opportunity to take an action. The USB device is then not visible to either your Mac or your virtual machine.

Cause

Some USB devices disconnect very quickly if they do not receive an immediate response upon connection. Occasionally, Fusion USB EasyConnect does not produce a response in the time required by these USB devices.

To work around this problem, you must configure the virtual machine so that Fusion connects unknown devices without first having to ask about the type of connection.

Solution

1. Shut down or power off the virtual machine.
2. Select **Window > Virtual Machine Library**.
3. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
4. Under Removable Devices in the **Settings** window, click **USB & Bluetooth**.
5. Under Advanced USB options, if the first option is set to **Ask what to do**, change the setting to **Connect to this virtual machine** or **Connect to your Mac**.
6. Start up the virtual machine.

   Plugging in a USB device results in it being connected to the virtual machine or Mac, depending on your setting, without going through the USB EasyConnect dialog. The device is also visible to the Fusion interface, so you can see it in **Settings > USB & Bluetooth**.

Add a Parallel Port

You can add a parallel port to your virtual machine.

Prerequisites

Shut down or power off the virtual machine. You cannot change the setting while the virtual machine is powered on or suspended.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Click **Add Device**.
4. Click **Parallel Port**.
5. Click **Add**.
6. Browse to the location to save the output file of the virtual parallel port.
7. Type a name for the file in the **Save As** field.
8. Click **Save**.

Add a Serial Port

You can add a serial port to your virtual machine.

Prerequisites

Shut down or power off the virtual machine. You cannot change the setting while the virtual machine is powered on or suspended.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Click **Add Device**.
4. Click **Serial Port**.
5. Click **Add**.
6. Browse to the location to save the output file of the virtual serial port.
7. Type a name for the file in the **Save As** field.
8. Click **Save**.

Sharing Bluetooth Devices with a Virtual Machine

You can attach a Bluetooth device to a virtual machine

Fusion supports these types of Bluetooth devices:

- Cell phones
- GPS receivers

- Serial Port Profile (SPP) devices
- Most other devices

Fusion has limited support for these types of Bluetooth devices:

- Input devices (HID): Can be attached to guests when using Linux/macOS hosts, but not on Windows hosts.

  OBEX File Transfer: Outgoing (guest to device) transfers only. Guest may not act as an OBEX server.

Fusion does not support these types of Bluetooth devices:

- Headphones
- Headsets
- Hands-free audio devices

Fusion has the following limitations for Bluetooth support:

- Only out going connections are allowed. A virtual machine may establish a connection to a remote Bluetooth device, but remote devices do not see services that virtual machines try to advertise.
- Virtual machines cannot change the name, class, or discoverability of the host's Bluetooth adapter. The host is exclusively in control over setting whether other Bluetooth devices can discover the host, and what name is used.
- The host is exclusively in control of the pairing process and collecting or displaying PIN numbers. The guest may scan for devices, and initiate a connection with any device. If pairing is required, the pairing dialog box appears on the host, not in the guest. From the guest's perspective, the device appears to pair without having needed a PIN.
- Any vendor-specific capabilities on the host's Bluetooth radio are not passed through to the guest. For example, some radios provide a vendor-specific command to change their BDADDR. These commands do not appear in the guest. The guest sees a generic VMware-brand radio.
- The virtual Bluetooth controller itself is not part of snapshots. During snapshots, it is disconnected and reconnected. Any ongoing connections with Bluetooth devices are terminated at the time of a snapshot.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under Removable Devices in the **Settings** window, click **USB & Bluetooth**.
4. Select the **Share Bluetooth devices with the virtual machine** check box.

   The virtual Bluetooth radio appears in the guest. You might see notifications from the guest OS that new hardware was detected. No action is required because the driver is automatically installed.
5. Use the guest's Bluetooth interface to search for nearby devices to pair with. Devices appear in the list as they are detected.

6 Select the device you want to connect with and select to connect to it.

7 Pair the device with the host.

If you have not paired this device with this host before, you are prompted to do so now. The host may ask you for a PIN, or may display a PIN to be entered on the device.

After the device pairs, the device is now available in the guest.

Configuring a Trusted Platform Module Device

You can add a virtual cryptoprocessor that uses Trusted Platform Module (TPM) technology to an encrypted virtual machine. Afterward, you can remove the cryptoprocessor from the virtual machine.

TPM technology provides hardware-based, security-related functions. A TPM cryptoprocessor carries out cryptographic operations. Fusion supports TPM version 2.0.

Create a Virtual Trusted Platform Module Device

For increased security, you can add a virtual cryptoprocessor that is equipped with Trusted Platform Module (TPM) technology to an encrypted virtual machine.

Prerequisites

- Create a virtual machine with a minimum hardware version of 14 that uses the UEFI firmware type.
- Encrypt the virtual machine. See Encrypt and Restrict a Virtual Machine.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Click **Add Device**.

4 Click **Trusted Platform Module**.

If the option is not available, the Trusted Platform Module device is not supported on the guest.

5 Click **Add**.

A dialog box appears.

6 Close the dialog box.

The virtual machine uses the virtual TPM device.

Note You cannot decrypt the virtual machine when the TPM device is present.

Remove a Virtual Trusted Platform Module Device

You can remove a Trusted Platform Module device from a virtual machine.

After you add a virtual cryptoprocessor equipped with Trusted Platform Module (TPM) technology to an encrypted virtual machine, you can then remove the TPM device.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. In the Removable Devices section, click **Trusted Platform Module**.
4. Click **Remove Trusted Platform Module**.

   A dialog box appears asking if you want to remove the device.
5. Click **Remove**.

Fusion removes the TPM device from the virtual machine.

Select a Startup Device

You can select the device to use to start up your virtual machine.

Prerequisites

Verify that the virtual machine is running. The change does not take effect if the virtual machine is not running.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under Other in the **Settings** window, click **Startup Disk**.
4. Click the startup device to use.
5. Click **Restart**.

   You can also hold down the **Option** key and click **Restart to firmware** to restart the virtual machine in firmware setup mode.

The guest operating system restarts and boots from the selected device.

Encrypting and Restricting a Virtual Machine

Encrypt and restrict your virtual machine to control the use of the virtual machine and access to its contents.

When you encrypt a virtual machine, you set a password that is required to open the virtual machine. You can remove the encryption or change the password at any time.

Note Large virtual machines, such as those that exceed 50GB, might generate a low disk space warning.

If you have Fusion Pro, you can also turn on restrictions, so that users are prevented from modifying the virtual machine. When you enable restrictions, users are prevented from removing virtual devices, changing the memory allocation, modifying removable devices, and changing the virtual hardware compatibility.

You can optionally force users to change the encryption password if they move or copy the virtual machine. For example, a teacher might provide a copy of the virtual machine to all students in the class and set this restriction so that all students must create their own encryption password.

You can also cause the virtual machine to expire at a pre-set date and time. When the virtual machine expires, the user is denied access to the virtual machine. You can extend an expired virtual machine by removing the restriction or setting another date and time.

When you turn on restrictions, you set a restrictions password. After restrictions are turned on, you cannot make changes to the virtual machine configuration settings or restrictions policies unless you first turn restrictions off. To turn off restrictions, you must enter the restrictions password.

The restrictions feature is available only if you have Fusion Pro.

Encrypt and Restrict a Virtual Machine

You can encrypt your virtual machine with a password to control access to the virtual machine and its contents. If you have Fusion Pro, you can also enable restrictions for the virtual machine to prevent users from changing certain virtual machine settings and to set an expiration date and time for the virtual machine.

When you enable restrictions for a virtual machine, you can set an expiration date and time for the virtual machine.

Use these guidelines when configuring encryption and restrictions:

- If you have a Fusion license, you can enable and disable encryption only if the virtual machine does not already have restrictions enabled.
- If restrictions are already enabled for a virtual machine, you can change encryption and restrictions settings only if you have a Fusion Pro license. If you have a Fusion license, encryption and restrictions settings are read-only. You can change only the encryption password.
- Restrictions policies are enforced only on virtual machines that are compatible with Fusion 5 and later.

Prerequisites

- Suspend or shut down the virtual machine.
- If you plan to turn on restrictions for the virtual machine, verify that you have a Fusion Pro license.

Note These instructions do not apply to Horizon FLEX virtual machines. To create a Horizon FLEX virtual machine, you must use Fusion Pro with a Horizon FLEX license. For information about encrypting and enabling restrictions for Horizon FLEX virtual machines, see the *VMware Horizon FLEX Administration Guide*.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under Other in the **Settings** window, click **Encryption & Restrictions**.

4 Select **Enable Encryption** and set the encryption password.

The password must be six characters or longer.

Important Make a record of the encryption password. If you forget the encryption password, Fusion does not provide a way to retrieve it.

5 (Optional) To store the encryption password in the Keychain password management system on your Mac, select **Remember Password**.

6 Click **OK**.

7 (Optional) (Fusion Pro only) To enable restrictions for the virtual machine, perform these steps.

a Select **Enable Restrictions** and set the restrictions password.

Important Make a record of the restrictions password. If you forget the restrictions password, Fusion does not provide a way to retrieve it.

b Click **Configure**.

c On the **Restrictions** tab, select the appropriate restriction options.

Option	Description
Require the user to change the encryption password	If the virtual machine is moved or copied, this option requires the user to change the encryption password for the virtual machine.
Allow USB devices to be connected to this virtual machine	USB device connections are allowed.

d On the **Expiration** tab, set the appropriate expiration options.

Option	Description
Restrictions Management Server	Specify any server that supports the HTTPS protocol to use as a trusted time source for the virtual machine.
Server contact frequency	Set the frequency with which the virtual machine contacts the server for a time check.
Maximum time the virtual machine can be used without server contact	Select how many days the virtual machine can be used without having to contact the time server.
Expire the virtual machine after	Set the date and time on which the virtual machine expires. After the virtual machine expires, you can delete or extend the expiration date.

e On the **Messages** tab, specify custom messages to show when the virtual machine has expired or is about to expire.

f On the **Certificates** tab, add certificates the virtual machine trusts when contacting the time server.

g Click **Save**.

h Click the **Lock** icon to lock restrictions on the virtual machine.

After a virtual machine is locked, users must provide the restrictions password to edit the current restrictions.

The virtual machine is encrypted. Users must provide the encryption password to open the virtual machine.

If you enabled restrictions for the virtual machine, many virtual machine configuration settings are hidden from the user of the virtual machine. To change these hidden virtual machine settings, users must have Fusion Pro and provide the restrictions password.

If you set an expiration date for the virtual machine, the virtual machine verifies the time and compares it to the expiration date when it is powered on. While running, the virtual machine periodically checks the time and stores all successful time stamps as the last trusted timestamp. If the last trusted timestamp exceeds the date set for the virtual machine expiration, the user receives a warning message and the virtual machine is suspended.

Change the Password for an Encrypted Virtual Machine

You can change the password for an encrypted virtual machine at any time.

Prerequisites

- Suspend or power off the virtual machine.
- Verify that you have the password for the encrypted virtual machine.

You must use Fusion Pro with a Horizon FLEX license to change the encryption password for a Horizon FLEX virtual machine.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under Other in the **Settings** window, click **Encryption & Restrictions**.

4 Click **Change Password**.

5 Type the old password for the virtual machine.

6 Type the password to use to encrypt the virtual machine.

Remember this password. You cannot access the virtual machine without it.

7 Type the password again.

8 (Optional) Select **Remember Password** to store the password in the Keychain password management system on your Mac.

9 Click **OK**.

The encryption password for the virtual machine is changed.

Remove Encryption From a Virtual Machine

You can remove encryption from a virtual machine at any time.

Prerequisites

- Suspend or power off the virtual machine.
- Verify that you have the password for the encrypted virtual machine.

You must use Fusion Pro with a Horizon FLEX license to remove encryption from a Horizon FLEX virtual machine.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under Other in the **Settings** window, click **Encryption & Restrictions**.

4 (Optional) Deselect the **Enable Restrictions** check box, if it is selected.

You cannot remove encryption from a virtual machine while restrictions are enabled.

5 Deselect the **Enable Encryption** check box.

6 Type the password for the virtual machine.

7 Click **OK**.

Encryption is removed from the virtual machine. You no longer not need a password to access the virtual machine and its contents.

Store the Password for an Encrypted Virtual Machine in Keychain

You can store the password for an encrypted virtual machine in your Mac's Keychain password management system at any time. Mac Keychain remembers the password for you.

You can store the encryption password in the Keychain password management system when you first encrypt a virtual machine. See Encrypt and Restrict a Virtual Machine. You also have the opportunity to store the encryption password in the Keychain password management system every time you are prompted for the encryption password.

Prerequisites

- Suspend or power off the virtual machine.
- Verify that you have the password for the encrypted virtual machine.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Select the **Remember Password** check box.
4. Type the password for the virtual machine.
5. Click **OK**.

The password for the encrypted virtual machine is stored in Keychain.

Virtual Machine Compatibility

The compatibility of a virtual machine with different versions of Fusion and other VMware products is based on its hardware version. The hardware version of a virtual machine is established by the version of Fusion that was used to create the virtual machine.

Consider upgrading the hardware version of your virtual machine if you upgrade Fusion or if you want to use the virtual machine in other VMware products.

You must power off a virtual machine before you change its hardware version.

Change the Hardware Compatibility of a Virtual Machine

The latest virtual machine hardware version available yields the best performance and most reliable behavior from the applications running in your virtual machine.

Virtual machines with hardware version 10 or later are created with SATA hard disks or CD drives. Upgrading your virtual machine from hardware version 9 or earlier does not change any devices in your virtual machine to SATA. If you want to use SATA disks or drives with your virtual machine, you must manually change the disk and drive types.

Prerequisites

- Evaluate the applications running in your virtual machine to determine which hardware version to select. Some applications might have specific hardware requirements offered through a virtual machine hardware version older than the latest available version.
- Consider taking a snapshot of the virtual machine. If changing the hardware version of your virtual machine results in undesirable behavior, you can revert to the snapshot taken before the hardware version upgrade.
- Shut down or power off your virtual machine before you change its hardware version.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under Other in the **Settings** window, click **Compatibility**.

4 Under Advanced options, select a hardware version from the **Use Hardware Version** drop-down menu.

   When you select a hardware compatibility setting, a list of the VMware products that are compatible with that setting appears. For example, if you select hardware version 10, a list of VMware products that this version supports appears. Limitations for the selected hardware version also appear.

   Some hardware options might not be available for selection, for example, older hardware versions that your current version of Fusion does not support.

5 (Optional) Click **Revert** to return to the hardware version that your virtual machine uses. When you revert your hardware version, you can view the compatibility and limits of your current hardware version.

6 Click **Apply** to change the virtual machine hardware version.

7 Click **Close**.

The hardware version of the virtual machine is changed.

What to do next

Power on the virtual machine.

Choose the Hardware Version for a Virtual Machine

Upgrading the hardware version of your virtual machine improves performance by increasing the memory limit, the number of processors utilized, and the amount of disk space available to the virtual machine.

Prerequisites

Verify that you have the latest version of VMware tools installed.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under Other in the **Settings** window, click **Compatibility**.

4 Under Advanced options, select a hardware version from the **Use Hardware Version** drop-down menu.

   Hardware version 12 enables higher performance of the virtual machine, including improved accelerated 3D graphics rendering.

Configuring Guest Isolation Options for a Virtual Machine

With the isolation option, you can restrict file operations between the virtual machine and the host system, and between the virtual machine and other virtual machines.

To configure guest isolation options for a selected virtual machine, select **Virtual Machine > Settings** and select **Isolation**.

The following restrictions apply:

- VMware Tools must be installed in the guest operating system to use guest isolation features.
- You cannot configure these options for a remote virtual machine.
- If the virtual machine is running macOS as the guest operating system, you can copy and paste text between the guest operating system and the host, but copying files is not supported.

Note The drag and drop and copy and paste operations are enabled by default. You might want to disable these operations to prevent files from being accidentally transferred between the virtual machine and the host system.

Table 8-3. Isolation Options

Option	Description
Enable drag and drop	When this check box is deselected, the following options are restricted. ■ Drag and drop files from the host system to a Linux or Windows guest operating system. ■ Drag and drop files from the guest operating system to the host system. ■ Drag files from a file manager to an application that supports drag and drop, or from applications such as zip file managers that support drag-and-drop extraction of individual files. To enable these operations, select the check box.
Enable copy and paste	When this check box is deselected, the following operations are restricted. ■ Copy and paste text and files from the host system to a Linux or Windows guest operating system. ■ Copy and paste from the guest operating system to the host system. ■ Copy and paste text and files from one virtual machine to another. To enable these operations, select the check box.

Managing Advanced Settings

You can monitor the power supply status, enable VNC access, enable Microsoft virtualization-based security, or configure other advanced functions for your virtual machine.

Configure Time Synchronization Between Guest and Host Operating Systems

You can configure whether the clock on the guest operating system is synchronized with the clock on the host.

If you turn on this advanced setting for time synchronization, the VMware Tools service, which runs inside the guest operating system, checks once every minute to determine whether the clocks on the guest and host operating systems still match. If not, the clock on the guest operating system is synchronized to match the clock on the host.

For more information about how VMware Tools time synchronization works and for instructions to turn it off completely, see the document called *Installing and Configuring VMware Tools* at http://www.vmware.com/pdf/vmware-tools-installation-configuration.pdf.

Prerequisites

Disable other periodic time synchronization mechanisms. Most guests have clock synchronization turned on by default.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under Other in the **Settings** window, click **Advanced**.

4 Select the **Synchronize time** check box.

Show the Mac Power Supply Status in the Virtual Machine

You can set the virtual machine to display the status of your Mac power supply.

When this feature is enabled, information about the Mac power status is passed to the virtual machine. The virtual machine can display the remaining charge on a battery and suspend or hibernate when the battery charge runs low. This feature is not supported on Mac OS X, OS X, or macOS virtual machines.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under Other in the **Settings** window, click **Advanced**.

4 Select the **Pass power status to VM** check box.

Troubleshooting Your Virtual Machine

You can decide what level of troubleshooting information to collect for your virtual machines.

The level of troubleshooting information collected can affect the performance of your virtual machine.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under Other in the **Settings** window, click **Advanced**.

4 Select an option from the **Troubleshooting** menu.

Option	Description
Default	Fusion determines the best setting for your virtual machine.
None	Fusion gathers no troubleshooting information from your virtual machine. This setting enables your virtual machine to run as fast as possible.

Option	Description
Hang/Crash	Fusion gathers correctness information about hangs or crashes in the virtual machine.
Performance	Fusion gathers performance information, such as when an operation is taking too long in the virtual machine.

What to do next

From the VMware Fusion menu bar, select **Help > Collect Support Information** to collect troubleshooting information that Fusion has gathered about a selected virtual machine. Fusion creates a `.zip` file on your desktop to contain troubleshooting data.

Change Hard Disk Buffering

Fusion automatically sets hard disk buffering according to what guest operating system you use, but you can change the setting.

Hard disk buffering can increase performance of your virtual machine. Hard disk buffering can also consume more memory on your Mac host than operating unbuffered. Fusion enables or disables hard disk buffering based on your virtual machine's operating system.

For all Windows Vista and later guest operating systems, Fusion defaults to unbuffered I/O for Mac hosts. The same is true for all Windows 2000, 2003, XP, and XP 64-bit guests newly created with this version of Fusion. All other guests default to buffered I/O on Mac hosts.

If you are not familiar with the options, keep the default setting.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under Other in the **Settings** window, click **Advanced**.
4. Select an option from the **Hard disk buffering** menu.

Option	Description
Automatic	Fusion determines your operating system and enables or disables hard disk buffering depending on which type of buffering provides the best performance.
Enabled	The virtual machine's operating system uses buffered I/O.
Disabled	The virtual machine's operating system uses unbuffered I/O.

Set Password Requirement for Opening a Boot Camp Virtual Machine

If you have a virtual machine that powers on the Boot Camp partition, you can set whether a password is required each time you open it.

Prerequisites

You must have a Boot Camp partition on your Mac, and you must have created a virtual machine to power it on.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under Other in the **Settings** window, click **Advanced**.

4 Select the password requirement by setting **Administrative privileges for Boot Camp disks**.

Option	Description
Never ask	When you open a Boot Camp virtual machine in Fusion, you do not need to enter a password.
Always ask	Each time you open a Boot Camp virtual machine, you must enter the password of the administrator account on the Mac.

Enable a VNC Client to Access the Virtual Machine Remotely

You can configure a virtual machine to allow any virtual network computer (VNC) client to access the virtual machine by connecting to your Mac.

VNC software enables you to view and interact with one computer from any other computer or mobile device anywhere on the Internet. VNC software is cross-platform, enabling remote control between different types of computers.

Table 8-4 describes the ways in which you can set up VNC.

Table 8-4. Options for VNC

Option	Description
Remote Desktop, Screen Sharing, or Third-party VNC server on the Mac host	■ Enables control of the entire host Mac, including Fusion and any other applications. ■ The connection to the server is made by using the host's IP address or hostname.
VNC server provided by Fusion	■ Available for each virtual machine. ■ Must use unique ports that are not already in use on the host Mac. ■ Enables control of the virtual machine whenever it is powered on, even before the guest operating system is running. ■ The connection to the server is made by using the host's IP address or hostname.
VNC server inside the virtual machine's guest operating system	■ The VNC server is installed in the same way as any other application inside the virtual machine. ■ Enables control of only the guest operating system and is available only after the guest operating system starts up. ■ When using bridged networking, the connection to the server is made by using the guest's IP address or hostname.

This procedure describes how to use the VNC server provided by Fusion to enable a VNC Client to access the virtual machine remotely.

Procedure

1 Select **Window > Virtual Machine Library**.

2 Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under Other in the **Settings** window, click **Advanced**.

4 Select the **Remote display over VNC** check box.

5 (Optional) Type a password.

Because data sent over VNC is unencrypted, do not use your regular password.

6 Identify the port on the Mac.

The default port is 5900. If you enabled screen sharing on the Mac, port 5900 might already be in use and you must use another port, such as 5901. For multiple virtual machines, increment the port number for each additional virtual machine.

Your virtual machine is now visible to VNC clients.

Configure Virtual Machine Power Options

You can configure Fusion to list the soft or hard option of specific power-option pairs in the **Virtual Machine** menu or the applications menu.

When you access the **Virtual Machine** menu or the applications menu ( ), Fusion lists the soft or hard option of each power-option pair, depending on which option is configured. You can configure the soft or hard option for each of the following power-option pairs.

- **Resume/Resume (hard)**

  The **Resume** and **Resume (hard)** options are the same unless you customize the `resume` script.

- **Shut Down/Power Off (hard)**
- **Suspend/Suspend (hard)**

  The **Suspend** and **Suspend (hard)** options are the same unless you customize the `suspend` script.

- **Restart/Reset (hard)**

For descriptions of the power commands, including information about power-option scripts, see Options for Fusion Power Commands.

Note Also, using a keyboard shortcut, you can switch to the option in a power-option pair not currently configured. For example, if the soft option of a power-option pair is configured, you can use a keyboard shortcut to list the hard option instead. See Switch Power Commands from the Default Options.

When you create a virtual machine in Fusion, the power commands default to the soft options. When you create the virtual machine in another VMware product, the virtual machine might default to the hard power options.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under Other in the **Settings** window, click **Advanced**.
4. Select the soft or hard option of each power-option pair.

Power-Option Pair	Power Options	
Resume/Resume (hard)	**Resume**	The soft option of the power-option pair.
	Resume (hard)	The hard option of the power-option pair. Also called the **Force Resume** option.
Shut Down/Power Off (hard)	**Shut Down**	The soft option of the power-option pair.
	Power Off (hard)	The hard option of the power-option pair. Also called the **Force Shut Down** option.

Power-Option Pair	Power Options	
Suspend/Suspend (hard)	**Suspend**	The soft option of the power-option pair.
	Suspend (hard)	The hard option of the power-option pair. Also called the **Force Suspend** option.
Restart/Reset (hard)	**Restart**	The soft option of the power-option pair.
	Reset (hard)	The hard option of the power-option pair. Also called the **Force Restart** option.

The power options in the **Virtual Machine** menu and the applications menu change with the powers options configured in the advances settings. For example, if you changed **Shut Down** to **Power Off (hard)** in the advanced settings, the **Virtual Machine** drop-down menu lists the **Power Off** option, not the **Shut Down** option.

Enable Verbose USB Debugging

You can configure Fusion to increase the log information about USB devices connected to a virtual machine.

When verbose USB debugging is enabled, Fusion logs more extensive information about connected USB devices. You can then collect the troubleshooting information.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under Other in the **Settings** window, click **Advanced**.
4. Select the **Enable verbose USB debugging** check box.

Fusion starts logging more extensive information about connected USB devices.

What to do next

Collect the troubleshooting information. See Troubleshooting Your Virtual Machine.

To discontinue the impact that increased logging has on virtual machine performance, such as on CPU and I/O performance, after you finish collecting troubleshooting information, unselect the **Enable verbose USB debugging** check box.

Enable Microsoft Virtualization-Based Security

You can enable Microsoft virtualization-based security (VBS) on supported Windows guest operating systems.

VBS reinforces the security of Microsoft Hyper-V. When you enable VBS, Fusion configures the virtual machine with the following settings.

Option	Required Setting	Fusion Settings Page
Firmware type	UEFI	Advanced Settings
Enable UEFI Secure Boot	Enabled	Advanced Settings
Enable hypervisor applications in this virtual machine	Enabled	Processors & Memory
Enable IOMMU in this virtual machine	Enabled	Processors & Memory

Prerequisites

- Create a virtual machine that uses hardware version 14 or later and one of the following supported guest operating systems.
  - Windows 10 Enterprise, 64-bit
  - Windows Server 2016
- To use Windows 2016 as the guest operating system, apply all Microsoft updates to the guest. VBS might not function in a Windows 2016 guest without the most current updates.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.
3. Under Other in the **Settings** window, click **Advanced**.
4. Select **Enable VBS**.

What to do next

For VBS to run in the guest operating system, you must also perform configurations in the guest. See Microsoft documentation related to virtualization-based security.

Configure a Firmware Type

You can select the firmware type of a virtual machine.

The following firmware types are available depending on the guest operating system.

Option	Description
UEFI	Unified Extensible Firmware Interface (UEFI) is an interface between the operating system and the platform firmware. UEFI has architectural advantages over Basic Input/Output System (BIOS) firmware.
Legacy BIOS	Standard BIOS firmware.

If you select UEFI, depending on the guest operating system, you might have the option of enabling UEFI Secure Boot. UEFI Secure Boot secures the boot process by preventing the loading of drivers and operating system loaders that are not signed with an acceptable digital signature.

Procedure

1. Select **Window > Virtual Machine Library**.
2. Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

3 Under Other in the **Settings** window, click **Advanced**.

4 Select an option from the **Firmware type** menu.

If the firmware type is not selectable, look for an explanation and, possibly, instructions at the bottom of the dialog box.

Note

- Once a guest operating system is installed, changing the firmware type might cause the virtual machine boot process to fail.
- If virtualization-based security (VBS) is enabled, the firmware type is set to UEFI and cannot be edited.

When you start the virtual machine, it boots with the selected firmware configuration.

Using the vmrun Command to Control Virtual Machines

9

You can use the `vmrun` command-line utility in VMware Fusion to control virtual machines and automate guest operations on VMware virtual machines. The `vmrun` utility is associated with the VIX API libraries.

The capabilities of the `vmrun` utility are summarized in the following sections.

Power Commands

Power commands control virtual machine operations. You can use power commands to start (power on), stop (power off), reset (reboot), suspend, pause, and unpause a virtual machine.

Snapshot Commands

A snapshot captures the state of a virtual machine at the time of the snapshot, including all data on virtual disks. You can then use the snapshot to revert the virtual machine to its previous state. Snapshots are useful for data backup and as a placeholder for development and testing. You can use snapshot commands to list existing snapshots of a virtual machine, create a snapshot, delete a snapshot, and revert a virtual machine to its state at the time of a snapshot. Revert to snapshot does not resume running a virtual machine, even if it was running at the time of a snapshot.

Network Adapter Commands

Network adapter commands allow you to control the virtual network adapters associated with a virtual machine. You can use network adapter commands to list, add, update, and remove a network adapter.

Host Network Commands

Host network commands allow you to list the host virtual networks and to list, update, or remove a port forwarding configuration.

Guest Operating System Commands

Guest operating system commands enable you to interact with a guest operating system in the following ways.

- Run an executable program in the guest operating system or run an interpreted script that you provide.
- Check if a file or directory exists in the guest, delete a file or directory, rename a file, list files, or create a new directory.
- Copy a file from the host to the guest or from the guest to the host.
- Create a temporary file in the guest operating system.
- Add a shared folder from the host, make a shared folder writable in the guest, or remove a shared folder.
- Capture a screen image from the guest.
- List the processes running in the guest operating system or end a process.
- Read or write a variable in the guest operating system's environment or virtual machine state.
- Obtain the IP address of the guest operating system.

The timeout, which is the wait period for VMware Tools, is five minutes for all guest-related commands.

General Commands

General commands include commands that list all running virtual machines, upgrade the virtual machine hardware version, install VMware Tools in the guest operating system, check the current status of VMware Tools, and delete virtual machines. Also, you can clone a virtual machine to create a copy of the virtual machine.

Template Virtual Machine Command

The name of the template virtual machine command is `downloadPhotonVM`. The command allows you to download the VMware Project Photon operating system virtual machine.

This chapter includes the following topics:

- Use the vmrun Utility
- Syntax of the vmrun Command
- Using Authentication Flags in vmrun Commands
- Running vmrun Commands

Use the vmrun Utility

No configuration is needed to use the `vmrun` utility on a Mac OS X, OS X, or macOS host.

The `vmrun` utility is included with Fusion and ready to run in a Terminal window.

Procedure

1 On your Mac, open a Terminal window.

2 Run the `vmrun` command to list the command-line options.

Syntax of the vmrun Command

The `vmrun` command syntax can contain authentication flags, commands, and parameters.

The following syntax applies to the `vmrun` command.

```
vmrun [AUTHENTICATION_FLAGS] COMMAND [PARAMETERS]
```

Using Authentication Flags in vmrun Commands

You can use authentication flags in `vmrun` commands to provide information required to access a system.

For example, you can use an authentication flag to specify the local host type because `vmrun` commands apply to both VMware Workstation and VMware Fusion host types. You can also use authentication flags to provide the credentials required to access encrypted virtual machines or a guest operating system.

Authentication flags must appear before the command and command parameters.

The `vmrun` command supports the following authentication flags.

```
-T hostType
```

```
-vp encryptedVirtualMachinePassword
```

```
-gu guestUser
```

```
-gp guestPassword
```

Product Type

The -T flag is optional. When you run `vmrun` commands with Fusion, `fusion` is the default. Use the -T flag for Fusion as follows.

```
vmrun -T fusion
```

Encrypted Virtual Machines

Encrypted virtual machines require a password for most operations.

```
-vp encryptedVirtualMachinePassword
```

Guest Operations

Guest operations require authentication by the guest operating system.

Use the following flags to specify the user name and password of the user in the guest operating system.

```
-gu  guestUser
```

```
-gp  guestPassword
```

Running vmrun Commands

The `vmrun` commands have syntax and other requirements that you must follow.

Path to VMX File

VMware stores virtual machines as a package that includes the virtual machine settings file, *`filename`*`.vmx`, and the virtual disks.

When required, you must provide the path to the `.vmx` file. The following examples are of paths to a Windows virtual machine and a Linux virtual machine, respectively, for Mac OS X, OS X, or macOS. Examples of the `vmrun` command include the relative path to the `.vmx` file instead of the absolute path that follows.

```
/Users/username/Documents/Virtual\ Machines.localized/Win10.vmwarevm/Win10.vmx
```

```
/Users/username/Documents/Virtual\ Machines.localized/Ubuntu16.vmwarevm/Ubuntu16.vmx
```

Important For `vmrun` commands that require VMware Tools, install the latest VMware Tools package and, especially after operating system updates, keep VMware Tools up-to-date.

Disabling Dialog Boxes

To prevent the `vmrun` utility from failing when you provide user input through a dialog box, you can disable dialog boxes.

The `vmrun` utility might time out and fail when you use the utility on a virtual machine that requires user input through a dialog box.

To disable dialog boxes, insert the following line in the virtual machine configuration file, the `.vmx` file.

```
msg.autoAnswer = TRUE
```

Syntax of vmrun Commands

The `vmrun` commands are divided into function categories.

The following tables list `vmrun` commands and parameters for Fusion according to their function. Parameters are listed one per line. Parameters enclosed in square brackets are optional. The vertical bar indicates a keyword choice.

The `vmrun` Power Commands and Parameters

Option	Parameters	Description
`start`	*path to .vmx file* `[ gui | nogui ]`	Starts a virtual machine. The default `gui` option starts the machine interactively, which is required to display the Fusion interface. The `nogui` option suppresses the Fusion interface, including the startup dialog box, to allow noninteractive scripting. **Note** To start encrypted virtual machines, use the `nogui` flag. The `vmrun` utility does not support GUI mode with encrypted virtual machines.
`stop`	*path to .vmx file* `[ hard | soft ]`	Stops a virtual machine. Use the `soft` option to power off the guest after running shutdown scripts. Use the `hard` option to power off the guest without running scripts, as if you pressed the power button. The default is to use the `powerType` value specified in the `.vmx` file, if present.
`reset`	*path to .vmx file* `[ hard | soft ]`	Resets a virtual machine. Use the `soft` option to run shutdown scripts before rebooting the guest. Use the `hard` option to reboot the guest without running scripts, as if you pressed the reset button. The default is to use the `powerType` value specified in the `.vmx` file, if present.
`suspend`	*path to .vmx file* `[ hard | soft ]`	Suspends a virtual machine without shutting down the virtual machine, so local work can resume later. The `soft` option suspends the guest after running system scripts. On Windows guests, these scripts release the IP address. On Linux guests, the scripts suspend networking. The `hard` option suspends the guest without running the scripts. The default is to use the `powerType` value specified in the `.vmx` file, if present. To resume virtual machine operations after the `suspend` command finishes, use the `start` command. On Windows, the IP address is retrieved. On Linux, networking is restarted.
`pause`	*path to .vmx file*	Pauses a virtual machine.
`unpause`	*path to .vmx file*	Resumes operations of a virtual machine from where you paused normal operations.

The `vmrun` Snapshot Commands and Parameters

Option	Parameters	Description
`listSnapshots`	*path to .vmx file* `[ showtree ]`	Lists all snapshots in a virtual machine. The `showtree` option displays snapshots in tree format, with children indented under their parent.
`snapshot`	*path to .vmx file* *snapshot name*	Creates a snapshot of a virtual machine. Because Fusion supports multiple snapshots, you must provide the snapshot name. Because the forward slash defines path names, do not use the slash character in a snapshot name. Otherwise, specifying the snapshot path later becomes difficult.

Option	Parameters	Description
deleteSnapshot	*path to .vmx file* *snapshot name* [andDeleteChildren]	Removes a snapshot from a virtual machine. Because Fusion supports multiple snapshots, you must provide the snapshot name. The virtual machine must be powered off or suspended. If the snapshot has children, they become children of the deleted snapshot's parent, and subsequent snapshots continue as before from the end of the chain. The andDeleteChildren option deletes the specified snapshot and its children recursively. See revertToSnapshot for solutions to name conflicts.
revertToSnapshot	*path to .vmx file* *snapshot name* or *path to .vmx file* *Snapshot/"Snapshot 2"/"Snapshot N"*	Sets the virtual machine to its state at snapshot time. However if the virtual machine was powered on at the time of the snapshot, vmrun reverts it to a suspended state, but does not resume running the virtual machine. If a snapshot has a unique name within a virtual machine, revert to that snapshot by specifying the path to the virtual machine's configuration file and the unique snapshot name. If several snapshots have the same name, specify the snapshot by including a full pathname for the snapshot. A pathname is a series of snapshot names, separated by forward slash characters (/). Each name specifies a new snapshot in the tree. For example, the pathname Snap1/Snap2 identifies a snapshot named Snap2 that was taken from the state of a snapshot named Snap1.

The vmrun Network Adapter Commands and Parameters

Only Fusion Pro supports the network adapter commands.

Option	Parameters	Description
listNetworkAdapters	*path to .vmx file*	Lists the network adapters in a virtual machine.
addNetworkAdapter	*path to .vmx file* *Network adapter type* [Host nework]	Adds a network adapter to a virtual machine. **Note** The network adapter type can be nat, hostOnly, bridged, or custom. When the network adapter is nat, hostOnly, or bridged, the Host nework parameter is not required. Only when the network adapter type is custom, must you specify a value for the Host nework parameter. For example, vmrun addNetworkAdapter *.vmx file* custom vmnet3. You must name a custom virtual network with one of the names listed in the Custom section of the Network settings panel of the virtual machine or the Fusion Network Preferences panel. .

Option	Parameters	Description
`setNetworkAdapter`	*path to .vmx file* *Network adapter index* *Network adapter type* [Host nework]	Updates a network adapter in a virtual machine. **Note** The network adapter type can be `nat`, `hostOnly`, `bridged`, or `custom`. When the network adapter is `nat`, `hostOnly`, or `bridged`, the `Host nework` parameter is not required. Only when the network adapter type is `custom`, must you specify a value for the `Host nework` parameter. For example, `vmrun addNetworkAdapter .vmx file custom vmnet3`. You must name a custom virtual network with one of the names listed in the Custom section of the Network settings panel of the virtual machine or the Fusion Network Preferences panel.
`deleteNetworkAdapter`	*path to .vmx file* *Network adapter index*	Removes a network adapter from a virtual machine.

The `vmrun` Host Network Commands and Parameters

Only Fusion Pro supports the host network commands.

Option	Parameters	Description
`listHostNetworks`		Lists all networks on the host.
`listPortForwardings`	*host network name*	Lists all available port forwardings on a host network.
`setPortForwarding`	*host network name* *protocol* *host port* *guest ip* *guest port* [Description]	Sets a port forwarding on a host network. **Note** To prevent the command from returning an error, use the `sudo` utility with this option. For example, `sudo vmrun setPortForwarding`.
`deletePortForwarding`	*host network name* *protocol* *host port*	Deletes a port forwarding on a host network. **Note** To prevent the command from returning an error, use the `sudo` utility with this option. For example, `sudo vmrun deletePortForwarding`.

The `vmrun` Guest Operating System Commands and Parameters

The timeout, which is the wait for VMware Tools, is five minutes for all guest-related commands.

Option	Parameters	Description
runProgramInGuest	*path to .vmx file* [–noWait | –activeWindow | –interactive] *program name* [*program arguments*]	Runs a specified program in the guest operating system. The –noWait option returns a prompt immediately after the program starts in the guest, rather than waiting for it to finish. This option is useful for interactive programs. The –activeWindow option ensures that the Windows GUI is visible, not minimized. It has no effect on Linux. The –interactive option forces interactive guest login. The option is useful for Windows Vista and Windows 7 or later guests to make the program visible in the console window. You must provide the full pathname of a program accessible to the guest. Also provide fully accessible path names for any files specified in the program arguments, according to the requirements of the program. VMware Tools and a valid guest login are required.
fileExistsInGuest	*path to .vmx file*	Checks whether the specified file exists in the guest operating system. VMware Tools and a valid guest login are required.
directoryExistsInGuest	*path to .vmx file* *directory path on guest*	Checks whether the specified directory exists in the guest operating system. VMware Tools and a valid guest login are required.
setSharedFolderState	*path to .vmx file* *share name* *path to folder on host* writable | readonly	Modifies the writability state of a specified folder shared between the host and a guest virtual machine. The value for the *share name* parameter is a mount point in the guest file system. The value for the *path to folder on host* parameter is the exported directory on the host. To make a shared folder writable or read-only, include the writable or readonly parameter.
addSharedFolder	*path to .vmx file* *share name* *path to folder on host*	Adds a folder to be shared between the host and guest. The virtual machine must be running for the addSharedFolder option to take effect. The value for the *share name* parameter is a mount point in the guest file system. The value for the *path to folder on host* parameter is the exported directory on the host. On Windows guests, a delay might occur before shared folders are visible to the runProgramInGuest, fileExistsInGuest, and directoryExistsInGuest options.
removeSharedFolder	*path to .vmx file* *share name*	Removes the guest virtual machine's access to a shared folder on the host. The virtual machine must be running for the removeSharedFolder option to take effect. The value for the *share name* parameter is a mount point in the guest file system.
enableSharedFolders	*path to .vmx file* [runtime]	Allows the guest virtual machine, specified by the .vmx file, to share folders with its host. After enabling, run the addSharedFolder option to specify each host folder to share. The optional [runtime] argument limits the sharing of folders until the virtual machine is powered off. Otherwise, the setting persists at the next power-on. **Note** The enableSharedFolders option takes effect after the shut-down and restart of the guest. No error message appears.
disableSharedFolders	*path to .vmx file* [runtime]	Prevents the guest virtual machine, specified by the .vmx file, from sharing folders with its host. The optional [runtime] argument limits the stop applied to the sharing of folders until the virtual machine is powered off. Otherwise, the setting persists at next power on. **Note** The disableSharedFolders option takes effect after the shut-down and restart of the guest. No error message appears.

Option	Parameters	Description
`listProcessesInGuest`	*path to .vmx file*	Lists all processes running in the guest operating system. VMware Tools and a valid guest login are required. For example, you can use the `–gu` and `–gp` options to log in to the guest.
`killProcessInGuest`	*path to .vmx file process ID*	Stops a specified process in the guest operating system. VMware Tools and a valid guest login are required. For example, you can use the `–gu` and `–gp` options to log in to the guest. The process ID can be any number listed after pid= in the output of the `listProcessesInGuest` option.
`runScriptInGuest`	*path to .vmx file* `[ –noWait | –activeWindow | –interactive ]` *interpreter path script text*	Runs the specified command script in the guest operating system. See the `runProgramInGuest` entry for an explanation of options. The *interpreter path* option runs the script. Provide the complete text of the script, not a filename. VMware Tools and a valid guest login are required. For example, you can use the `–gu` and `–gp` options to log in to the guest.
`deleteFileInGuest`	*path to .vmx file path to file on guest*	Deletes the given file from the guest operating system. VMware Tools and a valid guest login are required. For example, you can use the `–gu` and `–gp` options to log in to the guest.
`createDirectoryInGuest`	*path to .vmx file directory path on guest*	Creates the specified directory in the guest operating system. VMware Tools and a valid guest login are required. For example, you can use the `–gu` and `–gp` options to log in to the guest.
`deleteDirectoryInGuest`	*path to .vmx file directory path on guest*	Deletes the specified directory from the guest operating system. VMware Tools and a valid guest login are required. For example, you can use the `–gu` and `–gp` options to log in to the guest
`createTempfileInGuest`	*path to .vmx file*	Creates a temporary file in the guest operating system, and returns the path name of the temporary file created. The path name varies according to the operating system. You can run the `deleteFileInGuest` option to remove the file. VMware Tools and a valid guest login are required. For example, you can use the `–gu` and `–gp` options to log in to the guest.
`listDirectoryInGuest`	*path to .vmx file directory path on guest*	Lists contents of the specified directory in the guest operating system. VMware Tools and a valid guest login are required. For example, you can use the `–gu` and `–gp` options to log in to the guest.
`CopyFileFromHostToGuest`	*path to .vmx file file path on host file path in guest*	Copies a file from the host to the guest operating system. VMware Tools and a valid guest login are required. For example, you can use the `–gu` and `–gp` options to log in to the guest. Specify the source filename, or host filename, before the destination filename, or guest filename.
`CopyFileFromGuestToHost`	*path to .vmx file file path in guest file path on host*	Copies a file from the guest operating system to the host. VMware Tools and a valid guest login are required. For example, you can use the `–gu` and `–gp` options to log in to the guest. Specify the source filename, or guest filename, before the destination filename, or host filename.
`renameFileInGuest`	*path to .vmx file original filename new filename*	Renames or moves a file in the guest operating system. VMware Tools and a valid guest login are required. For example, you can use the `–gu` and `–gp` options to log in to the guest. Specify the source filename, or original filename, before the destination filename.

Option	Parameters	Description
`connectNamedDevice`	*path to .vmx file* *device name*	Connects the device named in the command to the guest operating system. You can only run this command when the virtual machine is powered on. You can use device names, such as `sound`, `serial0`, `Ethernet0`, `sata0:1`, etc. **Note** After you use the `vmrun connectNamedDevice` command to connect a disconnected sound device to a running virtual machine, powering off the virtual machine might disconnect the sound device from the virtual machine, even though the virtual machine settings list the sound device as connected.
`disconnectNamedDevice`	*path to .vmx file* *device name*	Disconnects the device named in the command from the guest operating system. You can only run this command when the virtual machine is powered on. You can use device names, such as `sound`, `serial0`, `Ethernet0`, `sata0:1`, etc. **Note** After you use the `vmrun disconnectNamedDevice` command to disconnect a connected sound device from a running virtual machine, powering off the virtual machine might reconnect the sound device to the virtual machine, even though the virtual machine settings list the sound device as disconnected.
`captureScreen`	*path to .vmx file* *output path on host*	Captures the screen of the virtual machine to a local file. The specified output file on the host is in PNG format. A valid guest login is required. For example, you can use the `–gu` and `–gp` options to log in to the guest.
`writeVariable`	*path to .vmx file* `[ guestVar | runtimeConfig | guestEnv ]` *variable name* *variable value*	Writes a variable to the virtual machine state or guest. You can set a non-persistent guest variable, `guestVar`, a runtime configuration variable,`runtimeConfig`, as stored in the `.vmx` file, or an environment variable, `guestEnv`, in the guest operating system. A guest variable is a runtime-only value that provides a simple way to pass runtime values in and out of the guest. Environment variables require VMware Tools and a valid guest login. For example, you can use the `–gu` and `–gp` options to log in to the guest. With Linux, setting the guest environment also requires root login.
`readVariable`	*path to .vmx file* `[ guestVar | runtimeConfig | guestEnv ]` *variable name*	Reads a variable from the virtual machine state or guest. You can get a guest variable, a runtime configuration as stored in the `.vmx` file, or environment variables in the guest operating system. Reading the `guestEnv` variable requires a valid guest login. For example, you can use the `–gu` and `–gp` options to log in to the guest. See the `writeVariable` entry for a description of variable types.
`getGuestIPAddress`	*path to .vmx file* `[ –wait ]`	Retrieves the IP address of the guest. When you use the `[ –wait ]` option, the command waits until the IP address is available. For example, the IP address is not available until the virtual machine powers on. If the network is not ready, the command returns to the command-line prompt immediately.

The vmrun General Commands and Parameters

Option	Parameters	Description
list		Lists all running virtual machines.
upgradevm	*path to .vmx file*	Upgrades a virtual machine to the current virtual hardware version. Has no effect if the virtual hardware version is the most recent supported. Power off the virtual machine, such as with the `vmrun stop` command. Wait a short period of time for the command to finish. Then run the `vmrun upgradevm` command.
installTools	*path to .vmx file*	Prepares to install VMware Tools in the guest operating system. In Windows guests with autorun enabled, the VMware Tools installer starts by itself. In Linux guests without autorun, the command connects the virtual CD-ROM drive to the VMware Tools ISO image suitable for the guest, but the installer does not start. You must complete the installation with additional manual steps, as described in the product documentation.
checkToolsState	*path to .vmx file*	Checks the status of VMware Tools in the guest. The possible states are unknown, installed, and running.
deleteVM	*path to .vmx file*	Deletes a virtual machine.
clone	*path to .vmx file* *destination .vmx file path* full|linked [–snapshot=Snapshot Name] [–cloneName=Name]	Only Fusion Pro supports the `clone` option. Creates a copy of the virtual machine.

The vmrun Template Virtual Machine Commands and Parameters

Option	Parameters	Description
downloadPhotonVM	*path to save the downloaded VM*	Downloads a VMware Project Photon operating system virtual machine.

Examples of vmrun Commands

The command-line examples that follow work on VMware Fusion. Ubuntu16 is the virtual machine example for Linux and Win10 is the virtual machine example for Windows.

Reboot Commands

- Reboot a virtual machine.

```
vmrun reset Win10.vmwarevm/Win10.vmx soft
```

Snapshot Commands

- Create a snapshot of a virtual machine

```
vmrun snapshot Ubuntu16.vmwarevm/Ubuntu16.vmx mySnapshot
```

- List snapshots on the virtual machine, showing the snapshot created in the previous command.

```
vmrun listSnapshots Ubuntu16.vmwarevm/Ubuntu16.vmx
```

- Revert to the snapshot you made, which suspends the virtual machine, and restart to resume operation.

```
vmrun revertToSnapshot Ubuntu16.vmwarevm/Ubuntu16.vmx mySnapshot
```

```
vmrun start Ubuntu16.vmwarevm/Ubuntu16.vmx
```

- Delete the snapshot by specifying its name.

```
vmrun deleteSnapshot Ubuntu16.vmwarevm/Ubuntu16.vmx mySnapshot
```

Network Adapter Commands

- List all network adapters on a virtual machine.

```
vmrun listNetworkAdapters Win10.vmwarevm/Win10.vmx
```

- Add a NAT network adapter to a virtual machine.

```
vmrun addNetworkAdapter Win10.vmwarevm/Win10.vmx nat
```

Host Network Commands

- List all networks on the host.

```
vmrun listHostNetworks
```

- Add a port forwarding on a host network with examples provided of the host network name, protocol, host port, guest IP address, guest port, and description.

```
sudo vmrun setPortForwarding vmnet2 tcp 8082 1.1.1.2 88 portforwarding-descriptioin
```

Running Guest Applications

Most `vmrun` guest operations require VMware Tools to be installed on the guest operating system.

- Start the command tool, minimized, on a Windows guest.

```
vmrun -gu guestUser -gp guestPassword runProgramInGuest Win10.vmwarevm/Win10.vmx -interactive
cmd.exe
```

- Start the command tool on a Windows guest as an active window on the desktop,

```
vmrun -gu guestUser -gp guestPassword runProgramInGuest Win10.vmwarevm/Win10.vmx -activeWindow -
interactive cmd.exe
```

- Run a batch script file on a Windows guest, with Perl as the script interpreter.

```
vmrun -gu guestUser -gp guestPassword runScriptInGuest Win10.vmwarevm/Win10.vmx C:\perl\perl.exe
C:\script.pl
```

- Run a batch script and keep running afterwards. To use `cmd.exe` on Windows, you must specify the script interpreter as null.

```
vmrun -gu guestUser -gp guestPassword runScriptInGuest Win10.vmwarevm/Win10.vmx ""
"cmd.exe /k \"C:\\Program Files\\Microsoft Visual Studio\\VC\\vcvarsall.bat\" x86"
```

- Run a Bash shell script on a Linux guest.

```
vmrun -gu guestUser -gp guestPassword runScriptInGuest
Ubuntu16.vmwarevm/Ubuntu16.vmx /bin/bash /home/user/myscript
```

- Start an X clock on a Linux guest, which requires the `-display` option to appear on the console.

```
vmrun -gu guestUser -gp guestPassword runProgramInGuest
Ubuntu16.vmwarevm/Ubuntu16.vmx /usr/bin/xclock -display :0
```

- Run the same X clock command, but return control back to the console immediately.

```
vmrun -gu guestUser -gp guestPassword runProgramInGuest Ubuntu16.vmwarevm/Ubuntu16.vmx -
noWait /usr/bin/xclock -display :0
```

- Run Firefox.

```
vmrun -gu guestUser -gp guestPassword runProgramInGuest
Ubuntu16.vmwarevm/Ubuntu16.vmx /usr/bin/firefox --display=:0
```

- Setting the guest environment with the `guestEnv` parameter requires root permission on Linux because the change affects subsequent commands issued by other users.

```
vmrun –gu guestUser –gp guestPassword writeVariable Ubuntu16.vmwarevm/Ubuntu16.vmx guestEnv SRC
tmp.example.com:1666
```

- List processes in a Linux guest and end the process numbered 8192.

```
vmrun –gu guestUser –gp guestPassword listProcessesInGuest Ubuntu16.vmwarevm/Ubuntu16.vmx
```

```
vmrun –gu guestUser –gp guestPassword killProcessInGuest UUbuntu16.vmwarevm/Ubuntu16.vmx 8192
```

- Run a Perl script on a Linux guest to remove DOS-style carriage returns from a file.

```
vmrun –gu guestUser –gp guestPassword runProgramInGuest
Ubuntu16.vmwarevm/Ubuntu16.vmx /usr/bin/perl –e
"open(FILE, '>/tmp/unix.txt'); while (<>) { s/\r\n/\n/ ; print FILE}" /tmp/dos.txt
```

- Run a Perl script on a Windows guest to insert DOS-style carriage returns in a file.

```
vmrun –gu guestUser –gp guestPassword runProgramInGuest Win10.vmwarevm/Win10.vmx
C:\cygwin\bin\perl.exe –e
"open(FILE, ‘>C:\Users\user\dos.txt’); while (<>) { s/\n/\r\n/ ; print FILE}"
C:\Users\guestUser\unix.txt
```

Guest to Host File Operations

- To copy a file from the host to a guest, the user must have write permission on the destination.

```
vmrun –gu guestUser –gp guestPassword copyFileFromHostToGuest Ubuntu16.vmwarevm/Ubuntu16.vmx
~/img.db /tmp/img.db
```

- To copy a file from a guest to the host, the user must have read permission on the source file.

```
vmrun –gu guestUser –gp guestPassword copyFileFromGuestToHost
Ubuntu16.vmwarevm/Ubuntu16.vmx /home/username/addr addr.txt
```

- To enable shared folders.

```
vmrun enableSharedFolders Ubuntu16.vmwarevm/Ubuntu16.vmx
```

- To share a folder on a Mac host with a particular Linux guest.

  Note Before sharing folders, you must enable them with the `enabledSharedFolders` option, or by selecting **Enable Shared Folders** in the **Sharing Settings** panel of the virtual machine. On Linux guests, the `/mnt/hgfs` directory is available for sharing, but you can use a different directory for shared folders.

  ```
  vmrun addSharedFolder Ubuntu16.vmwarevm/Ubuntu16.vmx sharedFolderName ~/Share
  ```

- To make a shared folder read-only or to delete the shared folder.

  Note Shared folders are writable by default.

  ```
  vmrun setSharedFolderState Ubuntu16.vmwarevm/Ubuntu16.vmx sharedFolderName ~/Share readonly
  ```

  ```
  vmrun removeSharedFolder Ubuntu16.vmwarevm/Ubuntu16.vmx sharedFolderName
  ```

  Note On Windows Vista and Windows 7 or later guests, only the Administrator account can use `copyFileFromHostToGuest` and `deleteFileInGuest` options to write and delete files in the `C:\` and system folders, or use the `createDirectoryInGuest` and `deleteDirectoryInGuest` options to modify system directories. Regular users, even those with administrator privilege, cannot perform these operations.

Guest Variables and Environment

- From the host, set a guest variable on the virtual machines.

  ```
  vmrun writeVariable Win10.vmwarevm/Win10.vmx guestVar vmstartdate 21April2017
  ```

- On the guest operating systems, read the guest variable that you just set.

  ```
  > rpctool.exe "info-get guestinfo.vmstartdate"
  ```

  ```
  $ vmware-rpctool "info-get guestinfo.vmstartdate"
  ```

- From the host, set a guest environment variable on a Linux virtual machine and verify by writing the environment variables into a temporary file.

```
vmrun writeVariable Ubuntu16.vmwarevm/Ubuntu16.vmx guestEnv LD_LIBRARY_PATH /usr/local/lib
Guest user: root
Guest password:
```

```
vmrun runScriptInGuest Ubuntu16.vmwarevm/Ubuntu16.vmx /bin/bash "usr/bin/env > /tmp/env.out"
Guest user: root
Guest password:
```

Note No output is sent to the host when you use the `runScriptInGuest` option with the `vmrun` command. Find the output of the command in the `/tmp/env.out` file on the guest.

- On a Linux guest, determine the IP address and set it in a guest variable.

```
$ ipaddr=`ifconfig eth0 | grep inet.addr`
$ vmware-rpctool "info-set guestinfo.theip $ipaddr"
```

- From the host, retrieve the IP address that was just set to the guest.

```
vmrun readVariable Ubuntu10/Ubuntu10.vmx guestVar theip
```

General Commands

- List running virtual machines.

```
vmrun list
Total running VMs: 2
Absolute-path-to-virtual-machine.vmx

Absolute-path-to-virtual-machine.vmx
```

- Prepare to install VMware Tools.

```
vmrun installTools Ubuntu16.vmwarevm/Ubuntu16.vmx
```

The Template Virtual Machine Commands

- Download a VMware Project Photon operating system virtual machine.

```
vmrun downloadPhotonVM ~
```

Using VMware Fusion REST API 10

Fusion REST API allow you to interact programmatically with the core VMware hypervisor and virtual machines.

Overview of Fusion REST API

You can send standard `GET`, `PUT`, `POST`, and `DELETE` requests through HTTP and HTTPS to control configuration and deployment options. For example, you can use the Fusion REST API to perform clone and power operations. You can perform network-related operations, such as to create and update virtual NIC configurations and to retrieve IP addresses from the virtual machine. You can also configure shared folders. Response payloads are delivered in JSON format.

Fusion REST API Considerations

Keep the following considerations in mind when using the Fusion REST API.

- The Fusion REST API is available only for Fusion Pro.
- The Fusion REST API service depends on `vmrest` and `vmdaemon` processes.
- The `vmrest` service runs as the user who starts it. For example, the `sudo vmrest` command runs as the root user.

Use the VMware Fusion REST API Service

You can access the Fusion REST API from a local machine or a remote machine.

Note To view the Fusion API online, see https://code.vmware.com/apis/218/fusion.

Procedure

1 Install Fusion on your Mac.

2 Before you start the REST API service the first time, set up your credentials.

   a In a Terminal window, run the `vmrest -C` command.

   b Enter a user name and password as prompted.

   The user name and password are saved to the `~/Library/Preferences/VMware Fusion/preferences` file.

   You do not need to set up credentials when you start the REST API on subsequent occasions.

3 Configure the REST API service for HTTP and HTTPS access.

You can configure the REST API service to provide HTTP access locally and HTTPS access both locally and remotely.

Option	Description
Provide HTTP service	a In a Terminal window, run the `vmrest` command. The command returns the IP address and port number from which you can access the HTTP service. The default IP address is 127.0.0.1:8697. b Open a web browser and go to http://*address-returned-by-vmrest-command*. c Click **Authorize** in the top-right corner of the Fusion API Explorer page. d To authenticate, enter the user name and password you configured in Step 2 above.

Provide HTTPS service	To enable remote access to Fusion REST API, you must configure the REST API service to provide HTTPS service. In this situation, when you use the `vmrest` command to start the REST API service, you must use the `-c` and `-k` options together to specify the certificate and private key.
	a In a Terminal window, run a command to generate a certificate and a private key.
	The example command that follows, generates a self-signed OpenSSL-based certificate and a private key.
	`openssl req -x509 -newkey rsa:4096 -keyout fusionapi-key.pem -out fusionapi-cert.pem -days 365 -nodes`
	b To start the Fusion REST API service, run the following command, replacing the placeholders with the full path to the certificate file, full path to the private key file, and the IP address from which you want to serve the REST API.
	`vmrest -c certificate-file -k private-key-file -i ip-address`
	The command returns the IP address and port number from which you can access the HTTPS service.
	c On a remote machine, open a web browser and go to https://*address-returned-by-vmrest-command*.
	d Click **Authorize** in the top-right corner of the Fusion API Explorer page.
	e To authenticate, enter the user name and password you configured in Step 2 above.

Upgrading Fusion

11

You can upgrade to a new version of Fusion in several ways.

Use these procedures to upgrade Fusion.

This chapter includes the following topics:

- Upgrade Fusion with Autoupdate
- Upgrade Fusion From a Download
- Upgrade Fusion to a Fully Licensed Version After the Evaluation Period
- Upgrading VMware Tools
- Uninstalling Fusion
- Force Virtual Machine Processes to Quit

Upgrade Fusion with Autoupdate

Fusion has a built-in software updater that checks for updates to Fusion and VMware Tools and downloads and installs the updates.

When the **Automatically check for updates** check box is selected in **VMware Fusion > Preferences**, Fusion checks for updates each time it starts. If Fusion detects a new version, it displays the **Software Update** window. The **Software Update** window has the following options.

Skip This Version	Select this option if you do not want to upgrade to the version described. Fusion ignores this version in any later Autoupdate checks. If you change your mind later, you can select **VMware Fusion > Check for Updates** to have Fusion display the **Software Update** window again.
Remind Me Later	Fusion closes the **Software Update** window. The next time Fusion starts, the **Software Update** window appears.
Download and Install	Fusion downloads the update files to your Mac and installs the updates.

Prerequisites

Verify that the **Automatically check for updates** check box is selected in **VMware Fusion > Preferences**.

Although Fusion can shut down your running virtual machines as part of this procedure, VMware recommends that you manually shut down or suspend your virtual machines before you begin.

Procedure

1. In the **Software Update** window, click **Download and Install**.

   Fusion downloads the update files to your Mac.

2. At the Ready to install update prompt, shut down any running virtual machines and click **Install and Restart**.

   Fusion downloads the update files to your Mac, displays a progress bar during the installation, and restarts when the installation is complete.

Upgrade Fusion From a Download

If you have an earlier version of Fusion, you can upgrade to the current version by manually downloading the Fusion disk image from the VMware Web site.

If you are upgrading Fusion, VMware recommends that you first remove the version of Fusion installed on your Mac. The process of installing, upgrading, and uninstalling Fusion does not modify existing virtual machines.

Prerequisites

Verify that all of your virtual machines are shut down and that Fusion is not running.

Procedure

1. Drag the previous version of Fusion to the trash.

   Fusion is in the Applications folder on your Mac.

2. Download Fusion from the VMware Web site at http://www.vmware.com/mac/.

   a Click the **Download** link and follow the subsequent links for an Electronic Download Distribution.

   b Click the download link and save the application to your Mac.

   The Fusion disk image is saved to your default download directory. The filename is `VMware-Fusion-x.x.x-xxxxxx.dmg`, where *x.x.x* is the application version and *xxxxxx* is the build number for the download release.

3. Double-click the `VMware-Fusion-x.x.x-xxxxxx.dmg` file to mount it.

4. Double-click the **VMware Fusion** icon to copy Fusion to your Mac and start it.

Upgrade Fusion to a Fully Licensed Version After the Evaluation Period

To continue using Fusion after using a free evaluation version or after an existing license has expired, you must purchase a license on the VMware Web site.

Procedure

1 Select **VMware Fusion > Buy Now or Enter License**.

2 License your Fusion installation.

Option	Action
You have a license key	Type the license key.
You do not have a license key	a Click **Buy**. b On the VMware Fusion page on the VMware Web site, select the version of Fusion to buy and click the corresponding button. c Follow the instructions to process your order.

Upgrading VMware Tools

You can upgrade VMware Tools manually, or you can configure virtual machines to check for and install newer versions of VMware Tools.

The guest operating system checks the version of VMware Tools when you power on a virtual machine. The status bar of your virtual machine displays a message when a new version is available.

For vSphere virtual machines,

```
A newer version of Tools is available for this VM
```

is displayed when the installed version of VMware Tools is out of date.

In Windows virtual machines, you can set VMware Tools to notify you when an upgrade is available. If this notification option is enabled, the VMware Tools icon in the Windows taskbar includes a yellow caution icon when a VMware Tools upgrade is available.

To install a VMware Tools upgrade, you can use the same procedure that you used for installing VMware Tools the first time. Upgrading VMware Tools means installing a new version.

For Windows and Linux guest operating systems, you can configure the virtual machine to automatically upgrade VMware Tools. Although the version check is performed when you power on the virtual machine, on Windows guest operating systems, the automatic upgrade occurs when you power off or restart the virtual machine. The status bar displays the message `Installing VMware Tools ...` when an upgrade is in progress. The procedure is mentioned below.

Note Upgrading VMware Tools on Windows guest operation systems automatically installs the WDDM graphics drivers. The WDDM graphics driver allows the sleep mode available in guest OS power settings to adjust the sleep options. For example, you can use the sleep mode setting **Change when the computer sleeps** to configure your guest OS to automatically go to sleep mode after a certain time or prevent your guest OS from automatically switching to sleep mode after being idle for some time.

Some features in a particular release of a VMware product might depend on installing or upgrading to the version of VMware Tools included in that release. Upgrading to the latest version of VMware Tools is not always necessary. Newer versions of VMware Tools are compatible with several host versions. To avoid unnecessary upgrades, evaluate whether the added features and capabilities are necessary for your environment.

Uninstalling Fusion

Uninstalling Fusion does not modify existing virtual machines.

Uninstall Fusion

You can uninstall Fusion from the Applications folder.

Prerequisites

Power off or suspend all running virtual machines and quit Fusion.

Procedure

- Drag the VMware Fusion application from the Applications folder on your Mac to the trash.

Force Virtual Machine Processes to Quit

If your computer prevents you from upgrading or uninstalling Fusion, you might have to use the Mac Activity Monitor to correct the problem.

In rare circumstances, the operating system in a virtual machine can quit unexpectedly in a way that leaves some virtual machine processes running. This situation can prevent you from upgrading or uninstalling Fusion. In this case, the installation or uninstallation Assistant might display a message that indicates that you cannot install or uninstall Fusion. To work around this problem, you can use the Mac Activity Monitor to force virtual machine processes to quit.

Procedure

1. In the Finder, select **Applications > Utilities** and double-click **Activity Monitor** to open the Activity Monitor.

2 Select **All Processes**.

3 In the **Process Name** column, select **VMware Fusion**.

4 Select **View > Quit Process**.

5 In the **Quit Process** window, select **Force Quit**.